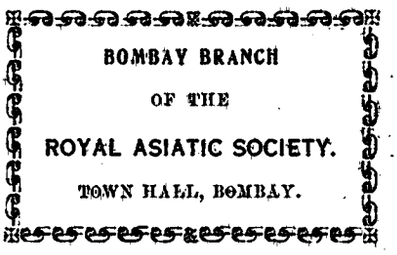
Land Records and
Agriculture, Bengal,
report

1893-94 to 1900-01

00133033



Digitized with financial assistance from

Government of Maharashtra

on 01 February, 2020

ANNUAL AGRICULTURAL REPORT

OF THE

DEPARTMENT OF LAND RECORDS AND AGRICULTURE

BENGAL,

133033

For the year ending 31st March 1894.

LIBRARY OF THE BOMBAY BRANCH OF THE ROYAL ASIATIC SOCIETY

Calcutta:

PRINTED AT THE BENGAL SECRETARIAT PRESS.

1894.

00133033

TABLE OF CONTENTS.

	PAGE.
CHAPTER I.—Analysis of districts with reference to security from famine	1
CHAPTER II.—Rent and revenue in precarious tracts	1
CHAPTER III.—Measures of protection :—Emigration to Burma ; Fuel and fodder reserves ; Arboriculture ; Silk experiments and eradication of pebrine ; Locusts and other insect pests	2—7
CHAPTER IV.—Agricultural experiments, including farms :—Experimental farms ; Experiments in Government, Wards' and private estates ; Crop experiments in jail gardens; Utilization of bones as manure; Manufacture of date sugar; Agricultural implements; Experiments made by members of the Agri.-Horticultural Society of India	7—19
CHAPTER V.—The Bengal Veterinary Department—Cattle-breeding	19—21
CHAPTER VI.—Notice of agricultural statistics	21—22
CHAPTER VII.—Miscellaneous :—Specification of inventions ; Agricultural exhibitions ; Supply of seeds, implements and manures ; Cost of agricultural experiments ; Officers of the Department	22—24

APPENDICES.

	PAGE.
A.—Mr. Nitya Gopal Mukerji's report on silk experiments	i—ii
B.—Annual Report of the Superintendent of the Civil Veterinary Department, Bengal . .	iii—xxiii

INDEX.

	Chapter.	Page.	Para.
Agricultural statistics	VI	21	59
——— exhibitions	VII	22—23	61
——— experiments and improvements in Wards', Government, and private estates	IV	9—15	22—44
——— implements	IV	17—18	48—54
Analysis of districts	I	1	5
Bone manure	IV	15—16	46
Burdwan farm	IV	7—8	19
Burma emigration	III	2	7
Cattle-breeding	V	20—21	57
Cost of agricultural experiments	VII	24	63
Crop experiments in jail gardens	IV	15	45
Date-palm	III	3—4	11
Divi-divi tree	III	4	13
Dumraon farm	IV	8	20
Eucalyptus tree	III	4	12
Experiments by members of the Agri-Horticultural Society	IV	18—19	55
Forest, fuel, and pasture reserves	III	2—3	8
Inga samun and albizzia procera	III	4	14
Insects injurious to crops	III	5—7	17
Locusts	III	5	16
Manufacture of date sugar	IV	16—17	47
Natuda farm	IV	11	32
Officers of the department	VII	24	64
Pig-breeding	V	21	58
Planting of trees	III	3	9
——— in Hazaribagh	III	3	10
Rent and revenue in precarious tracts	II	1	6
Sibpur farm	IV	8—9	21
Silk experiments and eradication of pebrine	III	4—5	15
Specifications of inventions	VII	22	60
Supply of seeds, implements, and manures	VII	23	62
Veterinary Institution, Bengal	V	19—20	56

OFFICE OF THE DIRECTOR OF THE DEPARTMENT OF LAND RECORDS AND AGRICULTURE, BENGAL.

No. 1935*Agri.*

FROM W. C. MACPHERSON, ESQ., C.S.,

Director of the Department of Land Records and Agriculture, Bengal,

TO THE SECRETARY TO THE BOARD OF REVENUE, L.P.

Dated Calcutta, the 25th July 1894.

SIR,

I HAVE the honour to submit the Report of this Department on agricultural enquiry, agricultural experiments, and agricultural improvements for the year ending 31st March 1894. This is the ninth Annual Report of this Department of this nature.

2. The Report contains information under the following heads:—

Chapter I.—Analysis of districts.
Chapter II.—Rent and revenue in precarious tracts.
Chapter III.—Measures of protection.
Chapter IV.—Agricultural experiments and improvements.
Chapter V.—The Bengal Veterinary Department; cattle-breeding.
Chapter VI.—Notice of agricultural statistics.
Chapter VII.—Miscellaneous.

3. A notice of the harvests of the year was given in the Report for the year ending 31st March 1893; but it has been observed that the orders contained in Government of India's circular No. $\frac{52G.}{69—6}$, dated 14th September 1887, make it clear that Government do not desire that the Reports of Agricultural Departments should contain such notices of harvests. Those orders were considered at the Agricultural Conference held at Simla in October 1893, and no alteration of them was proposed. In the present Report, therefore, no notice of the harvests has been inserted.

4. The arrangement of chapters slightly differs from the arrangement of last year's Report, and is intended to comply strictly with the orders of Government.

CHAPTER I.

ANALYSIS OF DISTRICTS.

5. Owing to pressure of statistical work in this office, it was not found possible to begin an analytical report for another district during the year under report. Up to the present, reports on the agriculture of four districts, viz.—Burdwan, Dacca, Cuttack and Lohardaga, have been written since 1886 by the Director's Assistants, in compliance with the orders contained in the Government of India's Resolution, No. 445A., dated 14th May 1885.

CHAPTER II.

RENT AND REVENUE IN PRECARIOUS TRACTS.

6. No special action was taken during the year which requires notice under this head in this Report. A full account of the settlements of rent and revenue under the Director's control is to be found in the Annual Reports of this Department on Settlements.

CHAPTER III.

MEASURES OF PROTECTION.

7. *Emigration to Burma.*—The agreement which was in force with regard to subsidizing the British India Steam Navigation Company for the conveyance of "State emigrants" to Burma, and which was approved by the Government of India in their letter No. $\frac{1447R.}{606}$, dated 1st December 1890, came to a close on the expiry of the postal contract with the Company on the 31st March 1894. Under that agreement, deck passengers certified to be "State emigrants" from Bihar (including Bhagalpur and Monghyr), Chota Nagpur or Orissa, were carried from Calcutta to Rangoon at Rs. 5 a head, instead of the usual fare of Rs. 10, while the Government of India paid to the Company a subsidy of Rs. 2-8 for each such emigrant carried to Burma. The Company undertook to establish recruiting agencies in Bihar, Chota Nagpur, and Orissa, and to deposit in the Collectors' offices tickets for deck passages from Calcutta to Rangoon to be sold at Rs. 5 a head. This agreement having expired, the British India Steam Navigation Company have expressed their willingness to continue to convey "State emigrants" to Burma under the conditions hitherto in force; and the Bengal Government has sanctioned payment to the Company of a subsidy of Rs. 2-8 per head, subject to a maximum of Rs. 1,000 per annum.

The remarks made by the Honourable Mr. Mackay (now Sir James Mackay), Chairman of the British India Steam Navigation Company, on emigration to Burma in 1892-93, were quoted in my Annual Report for that year. Sir James Mackay believed the movement to be gaining in popularity, and anticipated a substantial increase in the number of emigrants conveyed during 1893-94. There was, however, a large falling off in the number of "State emigrants" shipped last year. Only one batch of emigrants, consisting of 10 men, 8 women, 7 children, and 7 infants, left Calcutta and Burma, against five batches, consisting of 191 men, 2 women, 89 children, and 33 infants, in the previous year. The cause of the falling off in the number of emigrants to Burma is ascribed to the good harvests reaped last year in these Provinces.

8. *Fuel and Fodder reserves.*—As explained in page 4 of this Department's Report for the year ending 31st March 1893, instructions were issued in July 1892, under the orders of Government, to the Settlement Officers of Chittagong and the Western Duars to place themselves in communication with the officers of the Forest Department in order that proposals might be made for the establishment, where necessary, of fodder, fuel, and pasture reserves. The Settlement Officer of Orissa was also requested to report what action he would propose to take in the matter of making such reserves. The Settlement Officer of Chittagong reported in April 1893, that no action could be taken in the reservation of particular areas until it was known what areas were available, *i.e.*, until the areas covered by previous settlements of the land revenue had been assigned to the mahals to which they belong. Referring to the notification of Government, which appeared in the *Calcutta Gazette* of the 24th January 1894, declaring that it is proposed to constitute certain lands reserved forests, the Settlement Officer now reports that the boundaries of the gazetted forests consist for the most part of settled lands of the adjacent thanas, and that until the record of rights now in progress is completed, it will not be possible to determine the boundaries of these forests. Mr. Allen has instructed his Assistant Settlement Officers not to grant settlements of any lands within the gazetted forests, and he will report further on this subject. In the last Annual Report of this Department, it was stated that instructions had been issued to the Revenue officers engaged in the Settlement of Orissa to make note of any tract of unsettled waste land of more than 10 acres, and to record whether the land is suitable for grazing, whether tenants have rights of grazing over such lands, and whether the needs of the villagers, as regards fuel and fodder, are fully satisfied. Mr. Maude, the Settlement Officer of Orissa, now reports that it has not been found practicable to do anything with regard to the creation of fuel and fodder reserves at the present stage of the settlement operations, beyond protecting such rights of cutting fuel and grazing as already exist by entering the right in the new settlement records. Mr. Maude adds that the zamindars, especially in the Balasore district, have evinced a great dislike to anything which can be construed

as an attempt to convert to Government, or public uses, the waste lands which they allege were settled with them at the time of the last settlement, with the right to bring them under cultivation, or otherwise disposing of them according to their pleasure. The Commissioner of Orissa in forwarding the Settlement Officer's report remarks that fuel and fodder reserves are essential to the welfare of the agricultural community, and their want in Bengal is an evil which cannot be easily remedied. A remedy, however, is possible, and should, in Mr. Cooke's opinion, be applied in Orissa, which is not permanently settled, and customary rights should be recorded and maintained, as is now being done.

Under instruction from the Commissioner of Rajshahi, the Settlement Officer of the Western Duars had maps prepared during the year for North and South Mainaguri and Changmari, showing the lands reserved for fuel and grazing grounds. In North Mainaguri, he has reserved considerable areas for these purposes, hardly any land in Changmari, and not much in South Mainaguri; but he thinks that the people in the two last parganas will use the reserves in North Mainaguri, and will also take their cattle to Falakata. He has made an entry in the settlement papers that the reserved lands are not to be leased out. He does not think that the time has yet come for making any reserves in Falakata, Alipur and Bhalka, where there is abundant waste and forest reserve. I need express no opinion on this question, which will come before the Commissioner.

9. *Arboriculture—planting and maintenance of trees in Government and Wards' estates.*—The following information under this head has been obtained from local officers:—In the Sunkerpore estate, in Dinajpur, a new teak plantation was established during the year, comprising an area of 12 bighas, which was planted out with 1,000 trees. The old plantations of teak, mahogany, sisu and mango-grafts continue to do well. Mango, jack and plantain trees were added to the orchard laid out last year at Anantpur in the Kujang estate in Cuttack, at a cost of Rs. 59-12-1. The young plants are reported to be thriving. The cocoanut plantation at Kajalpatia was maintained during the year at a cost of Rs. 105-0-8. Three hundred and fifty-three grafts were planted during the year under report in the orchard at Ganja, in the Kanika estate in Cuttack. An expenditure of Rs. 1,000 was sanctioned for maintenance of this orchard, out of which Rs. 411-10-3 only were expended. An experiment was made during the year at a cost of Rs. 21-2-0 in planting out the *Morus serrata* in Hariharpara, a village in Murshidabad district, appertaining to the Kassimbazar Ward's estate. It is reported that the plants are at present very small. They are being taken care of properly; but it is not certain that the soil is suitable for their growth. A sum of Rs. 83-10 was expended from the funds of the Kassimbazar estate for the purchase of fruit trees from the Botanic Gardens at Sibpur. The banks of an irrigation *ahar* were utilized by the Subdivisional Officer of Jahanabad in Gaya in planting out 750 toddy-palm trees on a Government estate. The trees are reported to be doing well.

10. *Planting of fruit trees in Hazaribagh.*—As reported last year, grape vines and grafts of apple, plum, pear, peach and orange trees were supplied to the Superintendent of the Reformatory School at Hazaribagh in 1888 for experimental cultivation. The Superintendent reports that the apple-trees are not doing very well; about 12 trees are still alive, and two of these have grown considerably, and have borne fruit of inferior size, which the Superintendent thinks may improve as the trees grow stronger and older. The plum trees with the exception of one tree, which gave a very fine crop for the first time last year, have made little progress since they were last reported on. The grape vines, especially those bearing fruit of a white colour, are said to be thriving. The Superintendent reported in April that one vine in his garden had 120 very fine bunches of fruit.

11. *Date-palms.*—From the report of the Commissioner of Chota Nagpur, through whom some date palm seed was supplied in 1888 to some of the Tributary States of that Division, it appears that many of the plants were destroyed by white-ants, but that some are doing well. Applications for more seed have been received from Sirguja, Udaipur, Korea, Gangpur, and Seraikela. The Deputy Commissioner of Hazaribagh reports that the five date-palms grown from seedlings received in 1888 from the Saharanpur Botanical Gardens are in good condition, their average height now being

4¼ feet, and the circumference of their stems just above ground level, one foot and six inches. Out of the 400 Tunisian date-palm seedlings sent to Hazaribagh from the Saharanpur gardens in the same year, 225 are reported to be alive and in fair condition. Their average height is reported to be four feet, and the circumference of their stems just above ground level is now about 15 inches. The Reverend D. A. Nottrott, of the German Mission, Ranchi, reports that the Egyptian date-palms originally supplied from Saharanpur and planted out in August 1890 in the Mission compound at Ranchi are growing well. The circumference of the larger palms just above the ground is now 2½ feet. The palms have required constant watering since last rainy season. The Subdivisional Officer of Sasaram reports that the Egyptian date-palms planted in 1888 in the Sasaram Subdivisional Office compound and those in the garden of Nasriganj continue to grow well; but the District Engineer of Patna states that the Egyptian date-palms grown in the Patna district do not flourish.

12. *Eucalyptus tree.*—(Eucalyptus globulus). The Deputy Commissioner of Hazaribagh reports that the Eucalyptus trees, over one hundred in number, reported to be in fair condition last year, are thriving well. The circumference of most of their trunks when measured, nine inches and six feet above ground level, are now two feet and nine inches and two feet and three inches respectively. The average height of the trees is 54 feet.

13. *Divi-Divi tree.*—(Cœsalpinia coriara). In the year 1887-88, attention was called by the Government of Bombay to the cultivation of the *Divi-divi* tree (Cœsalpinia coriara), the pods of which contain a large quantity of a powerful tanning material. On the institution of enquiries, it was found that some trees were planted in 1882 in the Sonthal Parganas, and it was reported that the soil of the district appeared to be suitable to their cultivation. The Deputy Commissioner now reports that the trees are thriving, and that two of them at Katikund have borne seed during the year. One tree was reported to have borne seed during the year 1891-92.

14. *Reclamation of usar lands by planting trees.*—It was stated in the last Annual Report that seedlings of the *Inga saman* and *Albizzia Procera* were distributed in Bihar in 1887-88, with a view to reclaim usar lands. From recent reports it would appear that the trees have not been found to be useful for this purpose, but on roadsides they thrive well and are ornamental and useful for firewood.

15. *Silk experiments and eradication of pebrine.*—Mr. Nitya Gopal Mukerji continued to have charge of the experiments in combating silkworm disease and rearing healthy seed. His report for the year is printed as an Appendix to this Report. Seed to the amount of 2,134 ounces produced by Mr. Mukerji's methods was sold during the year to cocoon-rearers in the silk districts, as compared with 1,900 ounces sold in 1892-93 and 1,035 ounces in 1891-92. The greater portion of this seed was produced by a native cocoon-rearer of Kagachira, who followed Mr. Mukerji's methods, but worked independently. The village of Kagachira being situated in the western outskirts of Malda and frequented by cocoon-rearers, it was found easy to sell the seed, and a considerable profit was realised by the rearer. A large stock of healthy seed was circulated in this way, chiefly in the district of Malda, where it is said to be specially appreciated by native cocoon-rearers. The seed has usually given good results for more than one generation. There were, however, some cases of total or partial failure due to local infection. Encouraged by the success of the Kagachira cocoon-rearer, two other cocoon-rearers are at present receiving instructions from Mr. Mukerji, with the object of setting up similar establishments in two other villages in Malda. The total expenditure incurred by Government on Mr. Mukerji's experiments during the year amounted to Rs. 7,955.

The Secretary to the Agri-Horticultural Society of India has kindly furnished me with the following report of silkworm-rearing experiments conducted at Alipore, near Calcutta, by the Silk Committee:—

"The silk experiments at Alipore, formerly conducted by Mr. Blechynden, have been carried on by the Silk Committee with success.

"The remainder of the land at the old distillery has been planted out with mulberry, and the breeding of both Nistri and Desi worms has been continued.

"No signs of any disease have appeared for a considerable time, and the quality of cocoons is steadily improving.

"Mr. J. Cleghorn early last year pointed out that other caterpillars which feed on mulberry from their earliest stage attack the mature leaf, apparently sucking the juice of them, and that he had been very successful with worms which he had raised on this principle, in place of following the usual plan of feeding young worms with immature leaf. The experiment was accordingly tried at Alipore, with the result that *flacherie* has entirely disappeared. Whether the rapidity with which immature leaf ferments has anything to do with this trouble is well worth investigation.

"The frequent feeding of the worms in the early stages has also been pursued, thereby greatly shortening the period required for ripening the crop. By reducing the amount of food, it was proved that the time taken till the worms spun could be greatly increased without apparently any detrimental effect to their health, but probably largely increasing thereby the risk of disease. Native cultivators in the districts compute 20 to 22 days in summer, and 45 to 50 days in winter, as the minimum between the hatching of the eggs and spinning of cocoons. The experiments at Alipore seem to show that these periods may be reduced to 16 and 35 days respectively by feeding on a full scale in the early stages. In this manner the produce of pure seed should have a better chance of escaping *pebrine*, even in infected districts, the time being too short to enable disease to develop.

"The Nari variety has at last been entirely rooted out, none having been seen for several bunds; the length of time that it has taken to get rid of this strain has been very remarkable.

"Though disease is apparently absent, the same precautions are adopted as if the seed were of the very worst description. Each month, male and female, used for seed, is carefully examined in a microscope. The walls and surroundings are plastered or whitewashed with a mixture of sulphate of copper, each bund. Fumigation with sulphur is resorted to every month, and the strictest attention paid to cleaning all the accessories, destroying litter, &c. It is thus hoped to continue a healthy race, and every attention will now be devoted to improvement of cocoons in size and quality of silk."

A grant of Rs. 500 was made from the funds of this Department in aid of the experiments at Alipore.

16. *Insect Pests—Locusts.*—Locusts are reported to have visited the following localities, viz, the districts of Burdwan, Gaya, Saran and the Sasaram subdivision of the district of Shahabad. In the Burdwan district a flight of locusts appeared in 1893, but was not observed to have caused any serious damage to crops. The Collector of Gaya reports that in the second week of June last three small straggling flights passed over the district, but hardly did any damage. The Collector of Saran states that locusts were noticed on one occasion in that district during the year, viz, about the 15th or 16th June in the Revilganj thana. The damage done is reported to have been slight. From Sasaram it is reported that a flight of locusts appeared during the year, which did some injury to the sugarcane crop.

17. *Other insects injurious to crops.*—From the reports received from the Commissioners of Divisions, it would appear that during the year under review insects did injury to crops in all Divisions of these Provinces, with the exception of Rajshahi and Chota Nagpur. Specimens of some of these insect pests were received in this office from five districts, and were sent for examination to the Superintendent of the Indian Museum.

The following is a summary notice of the specimens received by this Department during the year and forwarded for identification to the Museum authorities:—

(1) *Backergunge.*—One specimen was received, described as the "*Leda*" insect destructive to paddy. No report has been yet received from the Museum.

(2) *Cuttack.*—Insects "*Gundira*" damaged paddy crops in the Tributary State of killa Narsingpur. It was reported by Mr. E. C. Cotes that the specimens were received in too poor a state for identification, but that they may possibly be related to the stalk-borer (*Chilo oryzœellus*).

(3) *Balasore.*—Insects "*Gandhi*" and "*Dholi*" from Balasore were reported by Mr. E. C. Cotes to be of the species "*Leptocorisa acuta, Thunb.*"

(4) *Murshidabad.*—Pulse crops were injured by insects in the Jangipur subdivision. The specimens of insects received were reported by Mr. E. C. Cotes to be caterpillars belonging to the group "Noctues."

(5) *Dacca.*—Insects damaged aman crops in some parts of Munshiganj subdivision. The specimens furnished were reported by Mr. E. C. Cotes to be immature, but to be very much like the rice stalk-borer "*Chilo*" species.

The district reports give the following information with regard to damage done by insects. In the Burdwan and Birbhum districts, some damage was done to the paddy crops by an insect called "*bhempoo*" or "*bhepu.*" In the Jahanabad subdivision, in Hooghly, the *rabi* crops were damaged by a class of insects called "*merhi*" or "*jumpoka*" which, the Commissioner says, is a kind of *aphis.* In the Jangipur subdivision of Murshidabad, insects appeared in some places in thana Suti about November 1893, and caused damage to pulse crops. Samples of these insects were sent for identification to the Superintendent of the Indian Museum, who declared them, as above noted, to be caterpillars of the group "*Noctues.*" Another species of insect also appeared in the same thana and damaged wheat crops. From Berhampore it is reported by Mr. Nitya Gopal Mukerji, Deputy Collector on special duty, that the larvæ of *Agrostis suffusa* did great damage to the rape crop in the Murshidabad district, and that the same larvæ attacked the seedlings of cauliflowers in the jail garden of Berhampore. A mixture of one ounce of London purple, an ounce of unslaked lime, and three pounds of ashes applied as a fine dust to the plants, proved to be a successful remedy. A plot of cress in the Berhampore Jail garden was found covered with black larvæ, which were identified by the Museum authorities as the larvæ of a pyralid moth. A mixture of four ounces of kerosine oil thoroughly shaken up with four ounces of sour milk and added to ten seers of water, was applied to the plants, and is said to have been found effective. A small amount of damage was also caused to the rape crop near Berhampore by caterpillars, which were also probably larvæ of a pyralid moth, and by minute insects belonging to the *Aphides.* Minute *coccidæ* insects causing the disease called *takra* of mulberry have been identified by experts as *Dactylopius bromeliæ, Bonche.* The Sub-Deputy Collector in Falakata tahsil in Jalpaiguri reports that earth-worms injured tobacco plants in different parts of the tahsil. In the Dacca Division all the districts were visited more or less by insect pests. Those known locally as *papri, kaonia, shulla,* and *orchanga* appeared within the jurisdictions of the Keraniganj, Shabhar and Srinagar police-stations, and damaged the paddy and jute crops. The Deputy Superintendent of the Museum, to whom specimens of the insects were sent, reported that the insects seemed very much like the rice-borer of the *chilo* species. In Mymensingh insect pests appeared in the eastern and western parts of the Tangail subdivision and did considerable injury. In Faridpur some damage was done by a species of grub (*Barshá Poká*) to aman rice in thana Pansha. From Backergunge it is reported that on an average one-fourth and one-third of the crops in the Sadar and Patuakhali subdivisions, respectively, were injured by insects during the year. Insects known locally as *leda* caused injury to the paddy crop. In the Brahmanbaria subdivision in Tippera cut-worms are reported to have appeared in large numbers on the subsidence of floods in lowlands. In Noakhali the aman paddy crop in all parts of the district was damaged by insect pests, though not to any serious extent. In Tippera insects known as *seni poka* are said to have caused much damage to paddy by eating into the ears. The sub-manager of the Kasimbazar estate in Sarail reports that insects identified by the Museum authorities to be *noctues* caterpillars did great damage during the year to mustard and aman paddy crops. The Deputy Collectors in charge of the Satkania and Raujan circles in Chittagong report that insects damaged the paddy crops in parts of their tahsils. In the Patna district some damage was done to the rabi crops by insects. In the Shahabad district the rabi crops of some 10 villages in the Dinara police-station are reported to have been damaged by insects. In Saran there were "the usual attacks by the insects called *soorka* and *harda,* on gram and peas by the former, and on wheat and barley by the latter." In the Sadar subdivision and also in the Nagorbusti, Madhubani,

and Beniputty thanas of the district of Darbhanga, a kind of insect called *lahi* did damage to the rabi crops. In the Bhagalpur Division there was no visitation of any insect pest injurious to crops in any of the districts, except at Deoghur in the Sonthal Parganas, and in a few places in the Begusarai subdivision of the district of Monghyr. At Deoghur, owing to excessive rainfall, the lowland paddy was seriously injured by blight locally known as *kharka*. The insects known as *bhua*, *lurka*, *lahi*, *and kagra* also did injury to the gram, wheat, barley, khesari, kerao, masur, and linseed crops in the Begusarai subdivision. The Deputy Commissioner of the Sonthal Parganas reports that the zamindar of Pakur states that in his zamindari an insect pest appeared in 19 villages in pargana Ambar and did great injury to the wheat crop; the appearance of this insect is ascribed to want of rain at the proper season. In Orissa there was no occurrence of insect pests in the districts of Cuttack and Puri during the year. Two kinds of insects, locally known as *gandhi* and *dholi*, made their appearance near the town of Balasore and damaged the growing crops. The insects were found to belong to the species *Leptocorisa Acuta*, *Thunb*. In the northern part of the district the ripe paddy crops were attacked by a red insect known as *punangra*. No serious damage was, however, caused on either occasion. In some villages of the Angul subdivision of the Angul and Khondmal district, a species of caterpillar said to have been generated in the paddy-fields because of want of sufficient seasonable rain at the time of transplanting caused some damage to crops.

CHAPTER IV.

AGRICULTURAL EXPERIMENTS AND IMPROVEMENTS.

18. *Experimental Farms.*—Notices of the work done on the experimental farms have been curtailed with reference to the instructions contained in the Government of India's Circular No. $\frac{52G}{69\text{-}G}$, dated the 14th September 1887, and only a brief description has been given of results of special interest. Details of the cultivation on the Burdwan, Sibpur and Dumraon Farms are given in the Farm reports for the year which have been separately published.

19. *Burdwan Farm.*—During the year under report experiments were made at the Burdwan Farm with paddy, sugarcane, jute, and potato crops. Bonemeal, superphosphate, saltpetre, castor-cake, and cowdung were applied singly and in mixtures to all these crops, in order to test their comparative manurial values. The results of the experiment with paddy brought out the excellence of bonemeal and saltpetre as a combined manure for the crop. The plot to which these two manures were applied yielded 57 maunds of grain and 76 maunds of straw per acre, against an average outturn of 19 maunds 18 seers of grain and 21 maunds 9 seers of straw per acre of the unmanured plots. For sugarcane a mixture of castor-cake and bonemeal was found the most effective, yielding 63 maunds 27 seers of *gur* per acre. With jute it was found, as in previous years, that cowdung gives better results than superphosphate, saltpetre, castor-cake, or bonemeal. The experiment made with Naini Tal potatoes showed that cowdung, when mixed either with castor-cake or bonemeal, possesses higher manurial value than these manures used separately.

Sugarcane and paddy were also experimented with in order to ascertain the merits of different varieties of the crops. It was found that a fine variety of paddy grown from seed imported from Diamond Harbour, although yielding a smaller outturn than the coarse paddy ordinarily grown in Burdwan, gave better financial results, on account of the higher price given for it in the local market. The variety experiment with sugarcane was started for the first time during the year with only two kinds of canes (*khari* and *Cawnpur*). The results obtained brought out the superiority of the *Cawnpur* variety as a sugar-producer. The experiment will be extended gradually to compare the productiveness of canes grown in different parts of India.

The effects of deep and shallow-ploughing were tested for paddy, and of sowing in shallow lines and planting in deep trenches for sugarcane. Although a slightly higher outturn of paddy was obtained by deep cultivation with the Sibpur plough, the experiment did not show any very marked superiority of this mode of cultivation over the shallow-ploughing effected by

the ordinary country plough. As the experiment was made for the first time last year, it is not safe to draw any definite conclusions. Better results were obtained, as in preceding years, by planting sugarcane cuttings in deep trenches after the Mauritius system, than by sowing them according to the local method in irregular shallow furrows. Neighbouring cultivators have now adopted the former mode of planting in preference to their own method of sowing canes.

The experiment of *ratooning* canes, which was commenced in 1887, was continued during the year. The results obtained over a period of seven years point to the value of *ratooning* the thick-skinned but thin variety of *khari* canes. The cultivators in the neighbourhood of the farm have adopted this mode of growing canes.

Certain fodder grasses (*Sorghum* and *Reana luxurians*) were grown with success, and some silage was also successfully made.

The expenditure incurred in conducting the experiments at the Farm was met from the funds of the Burdwan Raj. The gross expenditure incurred during 1893-94, inclusive of the Overseer's pay, amounted to Rs. 2,087-14 against Rs. 1,864-5-9 of the preceding year, the increase of expenditure being due to an extension of the area of the Farm. The actual expenses of cultivation were Rs. 1,425-3 against Rs. 1,193-6 for the year 1892-93. The receipts obtained from the sale of the Farm produce including the valuation of stock in hand amounted to Rs. 1,391-8-10 against Rs. 1,167-7 shown for the previous year.

Dr. Leather, Agricultural Chemist to the Government of India, visited the Farm on the 21st of February, and expressed approval of the plan of experiments followed, and with regard to the results obtained on the farm, Dr. Leather considered that the work on the Farm had not been fruitless, and that time and money had not been wasted on the experiments. He also made some suggestions regarding the plan of experiments on the Farm, which will be carried out during the current year.

20. *Dumraon Farm.*—The experiments made on the Dumraon Farm during 1893-94 were directed—(1) to test the effect of deep-ploughing on the outturn of winter paddy and wheat as compared with that of shallow-ploughing; (2) to test the value of bone-ash as a manure for these two crops; (3) to test the value of saltpetre as a manure for wheat; and (4) to test the adaptability of *aus* paddy to the climate of Western Bihar. It was considered that the results of the year tend to establish the superiority of deep over shallow-ploughing.

The Crosskill roller for crushing clods and a bucket water-lift invented by Mr. J. L. Hauser were tried on this Farm during the year, as is noted in paragraphs 50 and 52 of this Report.

The Dumraon Farm is conducted at the expense of the Maharaja of Dumraon. The expenditure of the Farm, including that of an Economic Museum attached to it, amounted to Rs. 1,721-5-1, and the income to Rs. 400-13-8 during the year under report. The smallness of the receipts was due in part to the failure of the wheat crop on the farm as in the locality generally. Dr. Leather visited the Farm in February last. He remarked that the supervision of the Farm by the officers of this Department was insufficient. He also noticed the stiff character of the soil of the Farm and its consequent unsuitability for experiments, and made comments on the generally low outturn of crops. Dr. Leather also made some suggestions with regard to the future conduct of the Farm, which will be carefully borne in mind.

21. *Sibpur Farm.*—There were two classes of experiments made in the Sibpur Farm last year—(1) *comparative experiments* directed to test the relative merits of different kinds of manure or of different methods of cultivation, and (2) *crop experiments* directed to afford information as to the suitability and merits of new crops or new varieties of existing crops. Of the first class, there were four experiments, namely, (1) and (2) experiments to determine the value of saltpetre as a manure for sugarcane and cabbage as compared with castor-cake, which is the usual manure for these crops; (3) an experiment in deep *versus* shallow cultivation for jute; and (4) an experiment to compare the method of planting potatoes in double rows instead of single rows in the same furrow. The experiment with cabbage fully bore out the previous year's experience as to the beneficial influence of saltpetre on this crop. Planting potatoes in double rows resulted in considerably larger outturn, though it involved the use of a larger quantity of seed.

The crops experimented with last year were *khari*, *Saharanpur red* and three other varieties of sugarcane, oats, several fodder crops, *e.g.*, *sorghum*, *reana* and lucerne, and two Bengal and eight exotic varieties of tobacco. Among the results obtained the following may be noted as possessing special interest. A plot of land planted with the *khari* variety of sugarcane in 1891 gave its second ratoon crop (*i.e.* the third crop from planting), which amounted to 55 maunds 14 seers to the acre, and fresh shoots have again come up and promise to give a good crop this year. The profitable character of this variety of sugarcane has thus been abundantly proved by this experiment, and also by a similar experiment in the Burdwan Farm. The *Saharanpur red* variety also proved, as in previous years, to be more productive than the other varieties tried. *Sorghum* and *reana* were successfully cultivated as in previous years. Seeds of these grasses were supplied to an enterprising native gentleman, Babu Bhava Nath Sen, the lessee of the municipal lands at the Salt Water Lakes, who has established a small fodder farm and who during the year supplied fodder to the Calcutta Municipal *Gowkhana* at the contract rate of 5 annas per maund. The hopes expressed in the Board's Resolution on the Annual Report of this Department for 1891-92, that a large *sorghum* Farm near Calcutta might prove to be a paying concern, are, therefore, on a fair way to fulfilment.

A seed drill constructed by Mr. Basu was tried on the Farm during the year, and was found to work well, but it has not been yet put to a thorough trial.

Great care was taken in the matter of conserving manure on the Farm; and under Dr. Leather's advice observations are now being recorded on this Farm and at Dumraon with regard to yield and value of manure.

The gross expenditure on the Farm during the year under report amounted to Rs. 2,433-12-9 against Rs. 2,979-0-7 in 1892-93, and the gross income to Rs. 1,013-9-9 against Rs. 1,225-5-6 in the previous year. The net cost of the farm during 1893-94 amounted, therefore, to Rs. 1,420-3 against Rs. 1,753-11-1 in 1892-93. The cost is borne by Government.

The Farm was visited by Dr. Leather in February last. He considers the site and soil of the Farm to be unsuitable for an experimental farm, and supports a proposal made by Mr. Basu to convert it into a dairy farm.

22. *Experiments in Government, Wards' and Private Estates.*—The experiments briefly described below were undertaken during the year in Government, Wards' and private estates:—

BURDWAN DIVISION.

23. *Burdwan—Private estates.*—Mr. Banerjei reports that cultivators in the neighbourhood of the Burdwan Farm are beginning to evince much interest in the operations of the Farm. The number of cultivators who pay regular visits to the farm is steadily increasing. It was mentioned in the last Agricultural Report of this Department that in the year 1890-91 only three raiyats and in the following year only four raiyats had adopted methods of cultivation similar to those conducted on the Farm. During the year 1892-93 the number of experimenters had increased to 36, and Mr. Banerjei now reports that the number during the year under review had still further risen to forty-eight. Of these, 15 raiyats purchased cuttings of the *khari* variety of sugarcane from the Farm, and cultivated their crops under the instructions of the Overseer, while 14 others who were not able to get the cuttings from the Overseer purchased their own cuttings elsewhere, and then cultivated their crops according to the deep trenching system followed on the Farm with satisfactory results. The cultivation of Naini Tal potatoes may be now fairly said to have been introduced into the villages adjoining the Farm. It has become usual in some villages to subscribe for the purchase of good seed potatoes through this Department, and in the year under review about 15 raiyats so subscribed, and grew their potato crops under the guidance of the Farm Overseer, who reports that although in some cases the outturn did not come up to his expectations, several raiyats obtained so much as 50 maunds of potatoes per bigha, a result which may be considered very satisfactory. The cultivation of fine paddy from seed imported by the Farm from Diamond Harbour was tried by two cultivators, one of whom is said to have obtained very good results. It has not been found possible yet to induce the raiyats to record weighments; but Mr. Banerjei hopes that in course of time definite figures of results will be forthcoming.

Two small farms have been established in the neighbourhood of the Burdwan Farm, in which improved systems of cultivation are followed. The first of these, which is called the Power Model Farm in memory of Mr. A. W. Power, Commissioner of the Division, who has recently retired, belongs to Babu Bonamali Kundu, a wealthy merchant of Burdwan. The land here consists of a good sandy loam suitable for the cultivation of jute, sugarcane, and potatoes, all of which crops it is proposed to cultivate during the current year. The other farm is the property of Babu Hara Dhan Pal, a trader who takes an intelligent interest in the conduct of agricultural experiments. Sirajganj jute and *khari* sugarcane have been experimentally cultivated on this farm.

24. *Midnapore—Government Estates.*—Seed of the Naini Tal variety of potatoes was supplied to the Subdivisional Officer of Contai, who sold a portion of the seed to cultivators for experimental cultivation, and grew the rest under his own supervision. The experiment conducted by the Subdivisional Officer did not yield good results. It is reported that the plants at first grew well, but were afterwards damaged by ants. The results obtained by the purchasers of the seed are stated to have been more satisfactory. Fine paddy, seed of which was imported by this Department from Diamond Harbour, was also experimentally cultivated at Contai by the Subdivisional Officer. The outturn obtained from 2½ bighas of land was 14 maunds 20 seers of grain and 2 kahans 6 powns of straw which was sold for Rs. 30-2-0. The total cost incurred in the cultivation of the paddy inclusive of the price of seed was Rs. 26-15-6.

25. *Midnapore—Wards' Estates.*—Experiments were conducted during the year in the Malighati and Turka Estates. In Malighati experimental cultivation of Naini Tal potatoes was undertaken by 15 cultivators, as well as on the estate garden. The land of the cultivators was manured with cowdung, varying from 20 to 50 maunds per bigha, while the plot in the estate garden received 2½ maunds of oil-cake per bigha. The outturn on the latter plot amounted to 27 maunds 13 seers per bigha, while that obtained from the fields of cultivators varied from 8 to 25 maunds per bigha. These results cannot be said to be good, but the cultivation was in most cases financially successful, yielding a net profit from Rs. 4 to Rs. 20 per bigha. Wheat and Naini Tal potatoes were experimentally cultivated in Turka, but failed to give good results.

26. *Midnapore—Private Estates.*—An experiment with the Nankin and American varieties of cotton was undertaken by Babu Rajendra Lal De, of Midnapore, who reports that his crops failed owing to his inability to sow them in proper season. He has preserved some seed, and intends repeating the experiment during the current year.

27. *Hooghly—Government Estates.*—The Commissioner of Burdwan reports that jute was successfully cultivated in khas mahal Serampore from seed received from this Department, which was especially selected and imported from Sirajganj and which was distributed free. The fibre produced is stated to have been superior in quality to that commonly grown in Hooghly, and to be of a whitish colour, such as is appreciated by traders. Cultivators were well pleased with the results, and have asked for and have been supplied with fresh seed of the same kind during the current year.

28. *Hooghly—Private Estates.*—Jute was also experimentally cultivated from Sirajganj seed supplied by this Department by the Indian Husbandry Company on three bighas of their farm at Dingalhat near Trisbigha on the East Indian Railway line. The seed was sown on a sandy loam which had lain fallow for many years, being subject to annual inundations from the river Sarasvati, in early September. Owing to the peculiar situation of the land, the crop had to be cut before it had attained its full height. The Managing Agents to the Company report that the fibre obtained was regular and smooth, and was not *fossy* like the Lower Bengal or *deshi* jute grown simultaneously on the same farm. The outturn of three bighas amounted to 11 maunds 32 seers, which was sold at the Baidyabati market at the rate of Rs. 6-5 per bazar maund.

Naini Tal potatoes were successfully cultivated by an experimenter in the village of Khanyan on the East Indian Railway line.

29. *Birbhum—Private estates.*—The cultivation of jute with Sirajganj seed was tried by a raiyat in the village of Bhandiban, who reports that the crop was excellent and the yield very large.

PRESIDENCY DIVISION.

30. *Alipore—Private estates.*—Babu Chandra Nath Chaudhuri, an inhabitant of the village of Chatkaberia in Barasat subdivision, sent his son, in the year preceding the year under report, to work as an apprentice on the Burdwan Farm to learn the methods of cultivation there followed. During the year under report this gentleman grew Sirajganj jute, Naini Tal potatoes, peas, gram, barley, oats and *khari* sugarcane, seed of which he obtained through this Department. From the report received, it would appear that the results of his cultivation were fair. The quality of the jute and oats grown is reported to have been very good, and the produce is stated to have been profitably sold.

Barrackpore.—Mr. N. C. Bural at Nilganj cultivated, by way of a preliminary experiment, some Samshara sugarcane, Sirajganj jute, and Naini Tal potatoes under the instructions of Mr. Banerjei. The results obtained were satisfactory.

31. *Khulna.*—Naini Tal potatoes were grown only on $5\frac{3}{4}$ cottahs of land in the jail garden. The Superintendent reports that the actual outturn obtained was $19\frac{1}{2}$ maunds, a result which may be considered very satisfactory. The cost of cultivation was Rs. 15, and the money value of the outturn Rs. 39, so that the profit accruing from the cultivation amounted to Rs. 24.

32. *Nadia—Private estates.*—An account was given in the last annual report of the Farm established at Natuda by Mr. Bipradas Pal Chowdhry, a wealthy zamindar of the district, with the object of spreading a knowledge of agricultural improvements among his tenantry. The farm was managed in consultation with Mr. Basu. Several staples new to the district, viz., Naini Tal and Cherapunji potatoes, maize, Kaira tobacco, Buxar wheat, *sorghum* and *reana* were cultivated during the year under report; besides a large area was cropped with the ordinary crops of the district. Potatoes gave a fair crop, and the Kaira variety of tobacco appeared to be an improvement on the indigenous variety (*hingli*). The outturn of the rabi crops was not satisfactory owing to the failure of rains during the cold weather. A notice of improved implements tried in this Farm during the year is given in a later paragraph.

The canal, of which excavation was begun in the previous year, connecting the low-land area in the farm with the river Bhairab, was completed during the year. It is provided with a sluice-gate for the regulation of the water-supply, and appears to be a very useful permanent improvement of a class much needed in Lower Bengal.

33. *Jessore—Private estates.*—Efforts have been made since 1890-91 to introduce the cultivation of potatoes in a group of villages about 24 miles south of Jessore. They have as yet met only with partial success. Last year three maunds and 26 seers of Naini Tal seed-potatoes were supplied at cost price to ten cultivators of the locality. The results of cultivation were not quite satisfactory; but two out of the 12 cultivators obtained fairly good results, their outturn having been 5 and $8\frac{1}{2}$ times the seed used respectively. At Magura Babu Bhavananda Chakravarti, a medical practitioner, cultivated mulberry plants on about two bighas of land, and utilized leaves in rearing silkworms of Babuakhali. A similar experiment was made by Babu Pyari Mohun Guha. Both the above experiments were supervised by Mr. N. G. Mukerji. It is reported that no conclusions can be drawn yet from the results obtained. A small area in the estate of Babu Laksman Chandra Ash in Bongong was sown with potatoes. The land was well irrigated and manured with bone-dust. The outturn obtained was 35 maunds per bigha. An experiment in the manufacture of sugar from the juice of the date-palm was carried out at the village of Sagardari. The results of the experiment are stated in paragraph 47 of this Report.

The cultivation of Buxar wheat was tried by Babu Nafar Chandra Pal Chaudhry in Bongong, but the result was not satisfactory.

34. *Murshidabad.*—An experiment was conducted at the Berhampore Jail with Naini Tal potatoes. The seed was sown in three plots manured respectively with stable manure and castor-cake mixed together, and with stable manure and castor-cake only. The best results were obtained from the use of castor-cake. Small quantities of ashes and rape dust were added to all the plots to prevent attacks of insects which had done harm to the potato crop

in the jail garden in two previous years. Their application seems to have had the desired effect. Mr. Nitya Gopal Mukerji, who supervised the experiments both in this jail and in the jail at Khulna, remarks that the object with which these experiments were started, viz., to introduce potato cultivation in Murshidabad and Khulna where at present potatoes are imported from the Calcutta market, has been secured to a certain extent, inasmuch as private persons, the number of whom are steadily increasing, have taken to growing potatoes, as they have found the soil in both the above districts just as suitable for growing potatoes as that of districts where potatoes have been hitherto grown.

RAJSHAHI DIVISION.

35. *Pabna—Government Estates.*—In the Sirajganj subdivision of the Pabna district, Naini Tal potatoes were grown experimentally in five Government estates. The Commissioner of Rajshahi reports that the outturn was fairly good in one estate only. Buxar wheat was also tried on several Government estates, and the outturn in this case, too, is reported to have been satisfactory in one estate only.

36. *Rajshahi—Wards' Estate, Dighapatia.*—Experiments in this estate were commenced in the year 1891-92 by the Manager, who worked in consultation with Mr. Banerjei. In the last Annual Report it was noticed that *khari* sugarcane, Buxar wheat, oats and Naini Tal potatoes, crops all new to the district, were cultivated experimentally on this estate with great success. The experiments were discontinued, however, by the proprietor when he came of age last year.

37. *Jalpaiguri—Government Estates.*—Cultivation of the Naini Tal variety of potatoes was continued in the Mynaguri Tahsil with seed-potatoes supplied on payment by this Department. It was extended also to the Falakata and Alipore Tahsils. In order to encourage the cultivation of this variety of potatoes, and also the cultivation of oats and English vegetables, and the use of bone manure, a leaflet was prepared in Bengali, giving some simple directions, and was circulated among *jotedars* through the tahsildars of Mynaguri, Falakata, Alipore and Bhalka. The tahsildar of Falakata was supplied by this Department with 11 maunds of Naini Tal seed-potatoes, 1 maund of seed oats and an assortment of English vegetable seeds; the tahsildars of Alipore and Bhalka were supplied through the Subdivisional Officer of Alipore with 25 maunds, and the tahsildar of Mynaguri with 2 maunds of Naini Tal seed for distribution among *jotedars*. The seed was fully paid for by the recipients. In March last an Overseer of the Department went to the Western Duars to make enquiries as to the results of cultivation of the seed supplied. He visited 77 jotes in which Naini Tal potatoes had been cultivated, and ascertained that in 44 *jotes* the crop gave a good outturn and the cultivators were well pleased with the result; in 20 the crop gave a poor outturn, and in 13 it failed through damage caused by wild pigs or through absolute negligence of the cultivators. On the whole, the results of the cultivation of Naini Tal potatoes may be considered satisfactory.

Buxar wheat was tried in a number of places, but generally failed.

A small demonstration Farm was established at the end of the year 1892-93 at Mynaguri in close proximity to the tahsil office. It has been placed under the management of the tahsildar. The Farm is intended to serve as a model of cultivation for the *jotedars* of the Mynaguri tahsil. The boundaries have been planted with a large number of grafts of mango and other fruit trees and with pine-apples and different species of plantain. Several new staples were grown on the farm last year. Their results are briefly noted below:—

Potatoes.—Naini Tal potatoes (a new variety) were grown on about a *bigha* ($\frac{1}{3}$ acre) of land; one-half of the land was planted with cut sets, and the other with whole seed. The second half was practically a failure; but the first half gave a fairly good outturn, amounting to $6\frac{1}{2}$ times the seed used, or about 120 maunds per acre. By the side of the plot under Naini Tal potatoes was another plot, about half an acre in area, which was planted with country potatoes, and gave an outturn of only 23 maunds, or at the rate of about 46 maunds per acre. The superior productiveness of the Naini Tal variety was thus clearly brought out.

The usefulness of bone-ash as a preventive for insects became evident in the cultivation of Naini Tal potatoes last year on the Mynaguri farm. The use of this manure had been found on several previous occasions to confer immunity against the ravages of cutworms.

Barley.—About $1\frac{1}{4}$ bighas ($= \frac{5}{12}$ acre) were cropped with the up-country variety of barley. The indigenous variety of barley is so degenerated as to be hardly capable of recognition. The crop of up-country barley grew well; but shortly before harvesting it was seriously damaged by a hail-storm, and eventually gave an outturn of 2 maunds 5 seers of grain only. The grain is, however, of good quality and is a great improvement on the indigenous variety.

Maize.—The crop is new to the plains of the Western Duars; a little is grown by Sonthals and other outsiders who have settled in the district, but the natives never cultivate it. Maize was sown on about one acre of land; the crop grew exuberantly, but the outturn was comparatively poor.

An Australian variety of oats was sown, but failed to germinate. About one-third of an acre of land has been planted with sugarcane with a view to demonstrate the manufacture of jaggery. The crop is now on the ground and promises a fair outturn.

The expenditure of the Mynaguri farm for the year under report amounted to Rs. 502-9-0, and the income to Rs. 213-12-0. The expenditure was met from the funds at the disposal of the Deputy Commissioner for improvement of Government estates.

Dacca Division.

38. *Faridpur.*—Buxar wheat and Naini Tal potatoes were experimented with on some Government and private estates, but did not give good results.

Chittagong Division.

39. *Chittagong.*—The cultivation of Buxar wheat at Katgur in the estate of Fazalali Khan was not successful this year, as the crop suffered from want of rain. The seed used for the experiment was obtained from the previous year's crop. The Manager in charge of Wards' estates in Chittagong reports that the grain produced was very small in size and was wanting in colour. The cultivation of English vegetables, such as cabbage, lettuce, beet-root, knol-kohl, cauliflower, peas and turnips, was continued during the year in the Dohazari and Chakma Raja estates, and is reported to have been as successful as in previous years. The General Manager hopes that the cultivation of these vegetables will, in course of time, be introduced generally in the district. The cultivation of Naini Tal potatoes in both the above estates is said to have yielded fair results. It was noticed in last year's Annual Report that tobacco of the Havana and Rangpur varieties was grown in the experimental farm at Dohazari. Samples of it, which were sent for appraisement to the Secretary of the Agri-Horticultural Society of India, are reported to be of no use for the manufacture of cigars. The General Manager now reports that an experiment was undertaken during the year under review with Rangpur tobacco seed, but that it was interfered with by heavy rain in February last, which damaged many of the plants. He adds, however, that since the introduction of the Rangpur variety, many tenants have taken to growing it instead of that formerly grown by them from local seed, and that the price obtained by them for such tobacco has been higher than that obtained for the tobacco raised from their own seed. The results of curing during the year are not known yet.

Patna Division.

40. *Patna—Wards' Estates.*—The cultivation of Buxar wheat was undertaken during the last *rabi* season by raiyats of four estates appertaining to the minor Bhagwat Narain Singh, of Patna. The General Manager of the Court of Wards, Patna, reports that the average outturn of grain in Tulsipur Dosut mahal was $2\frac{1}{2}$ maunds per bigha, against 3 maunds 13 seers per bigha, the produce of local wheat. The former, however, was of better quality than the latter. In mahal Bishunpur, the average yield of grain per bigha amounted to 2 maunds 21 seers, against 5 maunds 36 seers per bigha, the average yield of the

local variety of wheat. In mahal Jaintipur Siriawan, the outturns of grain of Buxar and local wheat were 3 maunds and 6 maunds 25 seers per bigha respectively. The Buxar wheat produced in Bishunpur and Jaintipur Siriawan was of an inferior quality. In mahal Muzaffarpur-Berthu, the cultivation of Buxar wheat was comparatively successful, the outturn of grain obtained amounting to 5 maunds per bigha, against 4 maunds per bigha obtained from the local variety of wheat. The Buxar wheat produced here was fuller and healthier than the local wheat grown in contrasted plots.

41. *Gaya—Government Estates.*—Naini Tal potatoes were grown experimentally in the Government estates of Gaya from seed supplied by the Superintendent of the Government Botanical Gardens (? Saharanpur). The outturn was not satisfactory, a result attributed by the Collector of Gaya to bad selection of the soil and to the absence of manure, which is absolutely necessary for the successful cultivation of potatoes. The quality of the potatoes raised is stated to have been superior to the local produce.

Bhagalpur Division.

42. *Purnea.—Araria—Government Estates.*—An attempt was made to grow long-stemmed paddy on lands subject to floods, but owing to the sudden rise of water, the crops were totally destroyed. The Commissioner reports that the experimental cultivation of Buxar wheat was tried in some villages of Araria, but that it totally failed in all cases but one, in which an outturn of two maunds of grain only was obtained from 15 seers of seed.

Chota Nagpur Division.

43. *Chota Nagpur.*—In Hazaribagh the experimental cultivation of Buxar wheat was undertaken by the Manager of Encumbered Estates and by Todal Narain Singh of Gawan. The crops in the Encumbered Estates at first promised well, but are reported to have been subsequently attacked by disease, which reduced the outturn. The yield was only 2 maunds and 28 seers per local bigha, against 3 maunds and 20 seers, the average outturn from indigenous seed. The outturn obtained by Todal Narain Singh was still less, viz., 2 maunds per bigha. The Deputy Commissioner reports that the soil and climate of Hazaribagh do not appear to be suitable for the Buxar variety of wheat. Cotton cultivation was tried in the Jheria Wards' Estate in Manbhum, but is reported to have been a failure. Naini Tal potatoes were cultivated by the zamindar of this estate with success.

Orissa Division.

44. *Orissa.*—It was mentioned in the Annual Report of this Department preceding the period under review that, owing to the success of the experiment with fine paddy in the Madhupur estate in Cuttack, two maunds of this variety of paddy seed were imported from Diamond Harbour and despatched last year to Orissa for distribution among selected cultivators, with the object of extending the cultivation of fine paddy in the Division. The Commissioner reports that the experiment was undertaken under the supervision of local officers in Banki, Madhupur, Kujang, and Khurda, and by private gentlemen in Cuttack, Balasore, and Dhenkanal. The cultivation appears to have been satisfactory, and is reported by most of the experimenters as likely to prove more profitable than the cultivation of the ordinary coarse paddy usually grown in Orissa. Seed has been preserved in very many cases in order to try the experiment on a more extended scale during the present season.

Sirajganj jute seed was sent to Cuttack for experimental cultivation during the year, with the object of introducing jute of a good quality into the district, but no satisfactory results were obtained, as the crops are reported to have been damaged by floods. An experiment in the Banki Government Estate with three varieties of sugarcane showed that the *samshara* and *khari* varieties, cuttings of which were obtained from the Burdwan Farm, were superior as sugar producers to the local *kantari* variety. The outturn of *gúr* of the *samshara* variety was 5 maunds 20 seers per acre in excess of that obtained from the local variety, and that of the *khari* variety was 2 maunds 25 seers

in excess. A variety experiment with sugarcane, viz., with Bombay, *samshara* and *khari* canes, was also undertaken in the Madhupur ward's estate in Cuttack. Comparative results are not reported, but the experiment, which was conducted on three bighas and five cottahs of land, is said to have yielded a net profit of Rs. 175-12-6. The cultivation of Naini Tal potatoes was tried at Khurda and Balasore. The Subdivisional Officer of Khurda reports that the outturn from two plots sown under his supervision was in one case at the rate of $43\frac{4}{7}$ maunds and in another at the rate of $17\frac{1}{2}$ maunds per acre, the low outturn in one case being attributed to lateness in sowing. The quality of the potatoes is reported to be far superior to that usually obtainable in the district. The Subdivisional Officer says that potatoes can be successfully cultivated in Khurda, and seed has accordingly been stored for repeating the experiment during the next potato season. In Balasore, where the experiment with Naini Tal potatoes was repeated for the second time during the year under report, the crop was reported to have grown well at first, but it was subsequently damaged by white-ants. Experimental cultivation with Naini Tal potatoes was also undertaken at Angul, and is reported by the Commissioner to have proved successful at the head-quarters of the district. Buxar wheat cultivation was tried in Angul, but good results were not obtained.

Crop Experiments in Jail gardens.

45. His Honour the Lieutenant-Governor of Bengal having desired that jail gardens should be made use of in ascertaining the outturn of crops and in making experiments in manures, certain provisional rules for the conduct of crop experiments were prepared by me with the help of Mr. Basu, Assistant Director, and were circulated, in February 1893, by the Inspector-General to Superintendents of Jails in Bengal. The Inspector-General has kindly furnished me with returns of crops grown in 13 jail gardens in the year 1893-94. For *aus* paddy, one return has been received from Burdwan jail, one from Midnapore, one from Comilla, two from Noakhali, and three from Nadia,—total 8. For winter rice, one return has been received from Puri jail, two from Balasore, two from Rajshahi, one from Midnapore, and one from Mymensingh,—total 7. For maize, two returns have been received, namely, one from Birbhum and one from Midnapore. For wheat, two returns have been received, viz., one from Malda and one from Muzaffarpur. At Berhampore Jail three experiments were made in growing potatoes. The Malda jail sends a return of mustard, and Midnapore jail sends two returns of cultivation of *arhar*. The results of the experiments will be separately reviewed.

UTILISATION OF BONES AS A MANURE.

46. The manufacture of bone-meal was continued during the year under report at the Jalpaiguri, Darjeeling and Saran Jails. Except at the Saran Jail, the manufacture was conducted under the exclusive supervision of the Jail Department: at the Saran Jail it was carried on at the expense of this Department. The manufacture has, however, been discontinued at all the three jails under orders of the Inspector-General of Jails, who considered it to be injurious to the health of the prisoners.

At Jalpaiguri the supply of bones was obtained from Siliguri through a contractor. The total outturn of bone-meal during the year was $240\frac{1}{4}$ maunds, costing Rs. 217-14-6, inclusive of jail labour. Out of this outturn, 168 maunds 26 seers were sold for Rs. 252. The selling rates were Re. 1-8 per maund for fine and Re. 1 per maund for coarse meal. The principal purchaser was the Good Hope Tea Company, Limited, of the Western Duars. The Manager reported that he applied the bone-meal to tea-bushes in mixture with cowdung and wood-ashes, and found the compost to be very useful to tea-bushes that had been cut down, and also in bringing up young trees planted among old tea to fill up vacancies.

The Superintendent of the Darjeeling Jail reports that 227 maunds of bone-meal were produced during the year, and 214 maunds remained from the previous year. Almost the entire quantity was disposed of to Mr. A. H. Wathen,

of Springside Tea Estate, Kurseong. Small quantities were also sold' to Mr. Gammie of the Cinchona plantation, and another gentleman of Darjeeling. The cost of manufacture amounted to 13 annas per maund; and the bone-meal was sold at Re. 1 per maund, and for quantities over 50 maunds, at 14 annas per maund. The Superintendent, Babu Priyanath Mookerjee, reports that planters speak of bone-meal as the best manure for tea. The price is, however, said to be prohibitive. The manure shows no appreciable effect during the first year, but very good results are said to be obtained during the second and third years, when the meal becomes thoroughly disintegrated in the soil. The Superintendent of the Jail reports that there is a good field for some enterprising person or firm starting the manufacture of bonemeal with improved machinery in the district. There is an ample supply of bones, and the demand for bonemeal is reported to be practically unlimited among the tea planters. This statement would appear to be irreconcilable with the Superintendent's statement that the price of bone-meal is prohibitive. He possibly means that if bone-meal can be manufactured by improved machinery and put into the market at low rates, there will be an unlimited demand.

The total outturn of bone-meal at the Saran Jail last year amounted to 34 maunds 39 seers, valued at Re. 1-8 per maund. The manufacture, as stated above, has been discontinued since February last. It was mentioned in my last annual report that Mr. J. D. MacGregor, of Arrowa Factory, Saran, had purchased 200 maunds of bone-meal from the Saran Jail, and applied it to indigo at the rate of 10 maunds per local bigha. The manure failed to produce any appreciable effect on the last year's crop. It remains to be seen if it will influence the outturn of the crop this year.

It is much to be regretted that sanitary considerations made it necessary to abandon the manufacture of bone-meal at the Darjeeling and Jalpaiguri Jails. Mr. Bipradas Pal Chowdhry of Nadia, who owns several tea-gardens in Darjeeling, is making arrangements, under the advice of Mr. Basu, Assistant Director, to set up a steam mill for crushing bones on the Mohurgong Tea Estate near Siliguri. It is to be hoped that the venture will prove to be profitable.

A number of experiments was made by the Subdivisional Officer of Sasaram in several Government villages in his jurisdiction to test the value of bone-meal prepared from bones that had been kept buried in a pit for three years. The meal cost 14 annas per maund, inclusive of all charges. It was applied to paddy land at the rate of two maunds per local bigha (1 bigha=$\frac{5}{8}$ acre). Twenty-five bighas of land were thus manured, and it is reported that on the average there was an approximate increase of Rs. 6 in the money value of the outturn of paddy per bigha.

MANUFACTURE OF DATE SUGAR.

47. An account was given in my last Annual Report of an experiment made by Mr. Basu, Assistant Director, in Jessore, with a new process of sugar manufacture. The experiment consisted in making *jaggery* from the date-juice in shallow iron pans instead of the deep earthen vessels in vogue in the district, and in draining off the molasses by means of the centrifugal machine.

The experiment made in 1892-93 gave hopes that this new method of manufacture might prove to be profitable and an improvement upon the indigenous process. It was, therefore, decided to continue the experiments on a larger scale in the year under report. They were conducted during the year at Sagardari, a village in the Jessore district, about 28 miles to the south of the district station.

The chief aim of the experiment was to demonstrate the working and advantages of the turbine in refining sugar, that is, in freeing it from the adherent molasses; but a subsidiary object was to show the description and quality of jaggery suitable for treatment by the centrifugal machine. For the latter purpose, it was arranged to purchase fresh date-juice at a fixed rate of price from certain cultivators of the village. It was then boiled to jaggery in shallow iron pans under the supervision of men trained in the art of *gur*-making. A couple of *gur*-makers were selected for the purpose by Messrs. Thomson and Mylne, of Bihia, and a *gur*-maker from the Sibpur Farm was employed throughout the experiment. The Overseer of the Sibpur Farm also had supervision of the experiment for a short time. The

jaggery produced in the experiment was pronounced to be of exceptionally good quality, but it was found to be somewhat deficient in grain-sugar—a result which Mr. Basu attributes to the *gur*-makers being unaccustomed to deal with date-juice. In this respect, the men from Sibpur were more successful than the men imported from Bihia. It is said that the use of the shallow iron pans entailed a much greater consumption of fuel than would be required in the ordinary process of boiling, but on this subject no definite reply can be yet given. On the whole, although the advantages of the shallow iron pans over the deep earthen vessels used in the country have not been brought out by the experiment, it has succeeded in showing what kind of *jaggery* was required for the centrifugal machine. Mr. Basu remarks that the people who witnessed the experiment were not convinced of the advantages of the iron pan, but they have seen how far the quality of date *jaggery* could be easily improved, and they believed that with due attention to cleanliness of the earthen utensils used in boiling, they would be able to produce jaggery of as good quality as that produced in the experiment. It is therefore believed that, should the centrifugal machine come into use, there would be no great difficulty in securing jaggery of the requisite quality.

The experiment, so far as its chief aim was concerned, is reported to have been fully successful. A large quantity of jaggery was turned into sugar by the centrifugal machine. The machine excited an unusual degree of interest in the surrounding country, and many came from a distance to see it at work. In proof of the reality and extent of the interest it created in the neighbourhood, Mr. Basu cites examples of private individuals who sent in several lots of jaggery to be converted into sugar by the centrifugal machine. He also mentions it as probable that some private individuals will start the new process of sugar manufacture in the next season.

The advantages claimed for the centrifugal machine are—(1) that it enables the manufacturer to turn out sugar as fast as jaggery can be supplied, instead of waiting for six weeks or longer for his returns, (2) that *dalua* or *kaccha* sugar can be made with it at less cost than by the ordinary process; and (3) that as the sugar can be disposed of within a very short time of the purchase of jaggery, a smaller amount of capital is required for doing a given amount of business than in the system of manufacture now in vogue. The centrifugal machine has in recent years come into use in the great sugarcane-growing district of Shahabad in Bihar. The experiments made in Jessore in the last and previous years have afforded grounds for the hope that ere long it may be introduced into the date-growing districts of Central Bengal.

AGRICULTURAL IMPLEMENTS.

48. *The Sibpur plough.*—From the reports received from persons to whom Sibpur ploughs have been supplied, it appears that the plough is well adapted for breaking up light soils, although it is not found suitable for working in stiff, low, wet lands. It was noticed in the last Annual Report that Mr. J. Crowdy, of Darbhanga, has in previous years given a favourable opinion on this plough. He now reports that he finds the plough useful, but that it is not as strongly made as the "Hindustan" plough, which is more useful for ploughing up unbroken land.

The Survey Commissioner and Director of Land Records and Agriculture, Bombay, who has caused the plough to be used in the Bombay Presidency since the year 1891, makes the following remarks:—

"The plough was tried on the Poona Farm and in the Broach district. It is a light implement with a removable share and a short iron mould board, the latter, owing to its shortness, digging the soil and not inverting it much. The means of draught are the same as in a native plough. The draught is light, and when the soil is in a fit condition to be ploughed by an iron plough, the work done is excellent. But if the subsoil is moderately moist, a good deal of earth sticks to the iron mould board, and much time is lost in cleaning it off. For this reason, a wooden plough can be used with more advantage, sooner after rain, than the Sibpur or any other iron plough. The Sibpur plough is suitable only for medium black or light soil. In Broach those who have used it complain that both the bullocks and the ploughman have harder work with it than with the local plough."

Six Sibpur ploughs were purchased during the year from this Department by Mr. Pal Chowdhry, who reports that they did their work on his Farm more effectively than the country plough.

The Manager of the Dighapatia estate reports that the plough is too heavy to be worked by ordinary country bullocks. The Superintendent of the Purnea Jail reports that the plough worked well during the year under report. The Khas Mahal Tahsildar, Serampore, states that though the plough has been introduced amongst the raiyats of the estates under his charge, it does not find favour with them. The tahsildar is of opinion that there is no prospect of overcoming the firm conviction of the raiyats that the country plough is best suited to their soil and bullocks. The Manager of the Nayagram estate in Midnapore reports that the plough is well suited for turning up light land, but he finds that the share wears away when the implement is worked in very sandy soils. The Commissioner of Rajshahi reports that the Sibpur plough, which was introduced last year into the Maldwar estate in Dinajpur, is said to be an improvement over the kind of implement previously used in the estate.

49. *American hand-hoes.*—The favourable opinion recorded by Mr. Pal Chowdhry in the preceding year was fully confirmed by last year's experience. Four of these hoes supplied to him by this Department were used in the cultivation of *chillies* on 23 bighas of land. The cost of hoeing with these implements is reported to have been considerably less than the cost of hand-hoeing.

50. *Clod-crusher.*—The Cross-kill roller was tried during the year on the Sibpur Farm, and was found to work satisfactorily.

51. *Seed-drill.*—A notice of the seed-drill constructed by Mr. Basu and used on the Sibpur Farm is given in paragraph 21 of this Report.

52. *Water-lifts and tube-wells.*—Two hand chain pumps (water-lifts) and 56 discs for water-lifts were sold during the year by the Bengal Iron and Steel Company of Barakar. The Manager of the Dighapatia estate in Rajshahi, who gave an unfavourable report last year of the pump supplied to the estate in 1891-92, now remarks that it worked admirably during the year under report. A bucket water-lift invented by Mr. J. L. Hauser was worked on the Sibpur Farm and found useful.

Two tube-wells, which were purchased at a cost of Rs. 400, were sunk during the year in the Kassimbazar estate. Mr. Nitya Gopal Mukerji, Special Deputy Collector, who was in charge of the experiment, reports that the first well was sunk by him at a depth of 31 feet, and proved a success for two days only, when the pump ceased to act, owing to its being choked up with small pieces of bamboo which had got in accidentally. A second well was sunk 40 feet deep and failed to act altogether, though water percolated into it. As this one was sunk during the dry weather, Mr. Mukerji thinks that the pressure of water at the drive point was not sufficient to meet the continuous demand of the pump, although it was sufficient to cause percolation of water into the tube. He considers it advisable to have another trial with this pump during the rains, and remarks that if it works well it would be only necessary to sink the wells deeper in order to get a good supply of water for all seasons.

53. *Sugarcane mills.*—The Commissioner of Rajshahi reports that Bihia sugarcane mills were used with success by raiyats of the Maldwar ward's estate in Dinajpur. The mills are reported to have been extensively introduced in the Bhagalpur Division. In the Madhupur estate in Cuttack, the Bihia mill and shallow evaporating pans are reported to be much appreciated by the raiyats.

54. Under the orders of the Government of India, No. 23-103, dated 29th June 1892, Messrs. Basu and Banerjei, Assistant Directors, have caused photographs to be taken of agricultural implements ordinarily used in the districts of Burdwan, Rajshahi and Shahabad. The photographs with necessary descriptions will be submitted to Government.

EXPERIMENTS MADE BY MEMBERS OF THE AGRI-HORTICULTURAL SOCIETY OF INDIA.

55. From the Secretary's report for the year 1893, it appears that experiments were conducted during the year with fodder grasses and fibres, flower and fruit trees, and with different kinds of crops, such as wheat, oats, gram, potatoes, tobacco, and sugarcane. Manurial experiments made during the year by the Society's members pointed to the great value of bonemeal and

sulphate of iron. An account is given in the Society's report of silk experiments at Alipore, which have been noticed in paragraph 15 of this report. The annual flower and fruit show of the Society was, as usual, held at the Alipore Garden, and proved on the whole a successful one. At the request of the Secretary, a centrifugal cream separator and English butter churn were shown at work on the exhibition grounds by an Overseer of this Department, and seemed to have attracted many spectators. The number of plants sold during 1893 and sent out to members as part of their privilege amounted to 41,798, against 17,000 distributed in the previous year and 162,000 distributed in the year 1891.

This Department is indebted to the Society, and also to the Chamber of Commerce, for the cordial co-operation and ready aid which has been rendered during the year in all matters referred to them.

CHAPTER V.

BENGAL VETERINARY DEPARTMENT: CATTLE BREEDING.

56. *Bengal Veterinary Department.*—The work of the Civil Veterinary Department, Bengal, during the year may be noticed, firstly, with reference to the management of the Bengal Veterinary Institution, and, secondly, with regard to work done in the districts.

Completion of the buildings.—The erection of the buildings of the Bengal Veterinary Institution was completed on the 1st December 1893, three months later than was anticipated. The delay in the building operations was chiefly due to the unusual amount of rainfall of last season; and on account of the dampness of the buildings they could not be occupied till January 1894. The hospital was opened for the admission of patients on the 10th January 1894. Comfortable accommodation has been provided for 40 horses and 60 cattle; and there is space in the compound of the Institution for picketing out more animals, if necessary.

Meetings of the Committee of the Management of the Bengal Veterinary Institution.—The management of the Bengal Veterinary Institution continued to be in charge of a Committee of Management working in consultation with the Superintendent. The members of the Committee during the year were—

Rai Bahadur Sheo Baksh Bogla.	Mr. W. B. Gwyther.
Dr. Kailash Chandra Bose.	The Director of Land Records.

The Committee met four times during the year, viz., on the 10th August, 28th September, and 12th December 1893 and 13th February 1894, and there was a full attendance of members at every meeting but one. The principal business done at the meeting was as follows:—

(*a*) Draft rules submitted by the Superintendent, Captain W. D. Gunn, for the management of the Bengal Veterinary School, were revised.

(*b*) Captain Gunn's draft rules for the admission of animals into the Institution were considered and revised.

(*c*) Captain Gunn's report No. $80\frac{V.S.}{94}$, dated 13th February 1894, (1) on the management of the school, specially with reference to the selection of candidates for admission as students and the selection of stipend-holders and (2) on the admission of animals was considered.

Rules for the management of the Bengal Veterinary Institution approved by Government in January 1894.—Rules for the admission of animals into the hospital, and for the admission of students, allotment of stipends, examinations and award of diplomas were approved by Government and published in the *Calcutta Gazette*, dated 2nd January 1894.

Number of admissions of animals into the hospital.—From the date of the opening of the hospital, viz. 10th January 1894, to the end of the year under report, 50 horses and mules, 53 bullocks, and 3 dogs had been treated as patients. On the recommendation of Captain Gunn, a reduced scale of fees for the treatment of animals has been approved by Government since the close of the year, and has been published in Gazette Notification No. 49T.R., dated the 11th May 1894.

Proposal to make the Veterinary institution an infirmary for animals within the meaning of sub-section (2) of section 6 of Act XI of 1890.—A proposal was made by Captain Gunn that the Bengal Veterinary Institution should be declared an infirmary for animals within the meaning of sub-section (2) of section 6 of Act XI of 1890 (Act for the prevention of cruelty to animals), but the proposal was abandoned under orders of Government contained in their letter No. 111Agri., dated 10th January 1894, as it was more convenient that the offences mentioned in the above sub-section should be dealt with under section 5, Act I (B.C.) of 1869, the latter Act giving the police powers of arrest without warrant.

Admission of students into the Bengal Veterinary School.—Two hundred and ten applications were received from candidates for admission to study in the Bengal Veterinary School. Out of this number, 66 candidates were selected after examination as suitable for admission, but it appears that only 35 students were actually enrolled in the Institution during the period under review. Captain Gunn thinks that the failure of some of the selected candidates to enroll themselves was due to their not having been nominated to scholarships or to their not being assured that they would receive Government appointments on the completion of their full course at the Institution. Stipends of Rs. 5 a month were awarded to 15 students with effect from 1st March 1894.

Other work done by the Superintendent outside the Bengal Veterinary Institution. Information with regard to breeds of cattle.—In connection with his work outside the Bengal Veterinary Institution, Captain Gunn gives some interesting information which he has collected with regard to breeds of cattle and buffaloes in Bengal. When this information has been confirmed and is amplified, it will be incorporated in the Agricultural Ledger series. On the recommendation of Captain Gunn, indents were made by the Collectors of Mymensingh, Tippera, and Dinajpur for Burma bulls with a view to improving the breed of cattle, but difficulties were experienced in obtaining the bulls, and none have yet been brought to Bengal. Through the exertions of Mr. Tute, the Collector of the Dinajpur district, a sum of Rs. 2,250 was raised in that district, from local zamindars, for the purchase of good bulls and cows; and it is much to be regretted that there has been so much delay in complying with the requisitions. At the request of Mr. Gibbon, C.I.E., Manager of the Bettiah Raj, arrangements are also in progress for the importation of a bull from Nellore, which is required especially for the purpose of improving the milking qualities of animals and not, as in the case of Burman bulls, for the improvement of the breed of plough-cattle.

Information with regard to cattle-disease.—Captain Gunn notices that cattle-disease was persistent during the year under report in the districts of Noakhali, Faridpur, Singhbhum, Palamau, and Monghyr, but not to such an extent that it could be considered to be epidemic. The necessary veterinary knowledge is not yet available in the districts generally to indicate what is serious and contagious disease among the cattle.

Districts visited by the Superintendent.—Captain Gunn reports that he travelled 6,629 miles during the year. He visited the Sonepur fair on 16th November 1893, the Kalimpong fair on 28th and 29th November 1893, when he advised with regard to purchase of mules for the Commissariat Department. He also visited the Sodpur Pinjrapol frequently and attended the Simla conference in September 1893.

57. *Cattle-breeding.*—From the reports received from officers who have been supplied with breeding bulls in previous years, it would appear that some of these animals have done useful work, while others seemed to have lost their breeding powers. It is a matter of importance to decide as to whether this loss of power is in any way due to the change of diet or to other circumstances attending the importation of up-country animals into Bengal. Captain Gunn has been requested to investigate into the matter, and his report is awaited.

In the last annual report it was stated that the Hissar bull supplied to the Nadia jail had served 19 cows which were then all in calf. The Superintendent now reports that the new stock is very satisfactory, but adds that the bull is gradually losing its breeding power. The Hissar bull supplied to the Dacca jail is reported to have died. The Hissar bull in the Tippera jail proved useful. The bull, of the same breed, which was made over to the

Midnapore jail in December 1891, is reported by the Superintendent to have been of no use during the year. At the Bhagalpur jail 29 jail cows and eleven other cows were served by a Hissar bull. The stock, it is reported, is decidedly better than the local country breed of cattle, being larger in size and stouter and stronger in appearance. The bull itself is reported to be in good health and efficient. The Hissar bull maintained at Nasariganj is stated to be largely used by Government raiyats and private zamindars. It is said that the offspring of the Hissar sire are sold for better prices than those of ordinary bulls. Thirty-two cows were served during the year by the English bull supplied to the Arrah Municipality, of which six calved. The calves are reported to be fine animals and to resemble their sire in appearance. The bull on the Government estate at Buxar served 96 cows during the year, and the results are reported to have been satisfactory. Heifers got by this bull sold at Rs. 30 each when only eight or nine months old. The Sub-divisional Officer remarks that the bull has helped considerably towards the improvement of the local breed; but adds that it will be necessary to maintain three or four more bulls before any widespread and permanent improvement can be effected. The Sub-Deputy Collector in charge of Mynaguri tahsil reports that the stock produced by crossing with the Bachour bull did not show any improvement over the local cattle.

58. *Pigs.*—In December 1892, at the request of Mr. A. N. Paul, C.S., two Berkshire pigs were purchased for breeding purposes and sent to the Political Officer, for use in Sikkim. Mr. J. White, the Political Officer, reports that the pigs are well, but have not been successful in breeding.

CHAPTER VI.

AGRICULTURAL STATISTICS.

59. Forecasts and reports of crops were prepared and published by this Department during the year as follows:—

(1) Forecasts of the outturn of rabi crops of 1892-93, and of important special crops, viz., sugarcane, tobacco, mulberry, and poppy, were issued on the 20th April 1893.

(2) Preliminary forecasts of the *bhadoi* crops for the year 1893 were submitted to Government on the 22nd October 1893.

(3) A first forecast of the winter rice crop, showing the area and prospects of the crop up to 15th September 1893, was issued on the 6th October 1893.

(4) A final estimate of outturn of the *bhadoi* crops, 1893, was submitted to Government on the 13th December 1893.

(5) A final estimate of the winter rice crop was submitted to Government on the 12th December 1893.

Special and separate forecasts for particular crops and other statistical reports were also furnished as follows:—

(6) *Wheat.*—A final estimate of the wheat crop of 1893 was submitted to Government on the 6th May 1893.

(7) A first forecast of the outturn of the wheat crop of 1894 was submitted on the 16th February 1894.

(8) *Jute.*—A first forecast of the jute crop of 1893, showing the state of the crops up to the 15th of June 1893, was issued on the 1st July 1893.

(9) A final forecast of the jute crop for season 1893 up to the 15th August 1893 was submitted on the 1st September 1893.

(10) *Oilseeds.*—A final forecast of the oilseed crops for the year 1892-93 was submitted on the 26th May 1893.

(11) A first forecast of the oilseed crop for the year 1893-94 was issued on the 27th February 1894.

(12) *Cotton.*—A report on the early cotton crop was issued on the 13th December 1893.

(13) A report on the late cotton crop was submitted on the 27th February 1894.

(14) *Minerals and gems.*—Statistics of the production and value of minerals in each district of Bengal during the calendar year 1893 were compiled from the returns of district officers and submitted to Government on the 9th March 1894.

(15) *Agricultural implements.*—A list of agricultural implements and machines which have been tested in Bengal during the year ending 30th September 1893, and of those in use which are reported to have met with more, or less marked success, was submitted to Government on the 23rd November 1893, and published for general information.

(16) Tables of Agricultural Statistics for 1892-93 were prepared during the year in accordance with Bengal Government Resolution No. 1772, dated 4th May 1892, and were submitted after the close of the year to the Board of Revenue, Lower Provinces, on the 19th April 1894.

CHAPTER VII.

MISCELLANEOUS.

60. *Specification of inventions.*—Twenty-eight applications for patents of an agricultural character were received during the year under report from the Government of India in the Revenue and Agricultural Department, and opinions of experts were obtained upon them. Of these, six were applications for patents connected with the tea industry, and were sent to the Secretary to the Indian Tea Association for opinion, together with the fee paid by the applicant for an expert's opinion. Seven were applications for patents connected with the indigo industry, and were sent to the Secretary to the Indigo Planters' Association. The remaining fifteen applications were for patents connected with the cleaning of grain seeds, &c. These were sent to the Secretary to the Agri-Horticultural Society of India, who obtained the opinion of Mr. H. J. K. Green, Member of the Institute of Civil Engineers, on the inventions.

61. *Agricultural Exhibitions.*—Agricultural exhibitions were held during the period under review at Cossipore, Kushtia, Kalimpong, Falakata, and Alipur, and were assisted with grants of money from this Department. Besides these, local shows and fairs were held under the direction of local officers at Pabna, Chapra in Nadia, Faridpur, Jalpesh in Jalpaiguri, and in Kuch Bihar, without any pecuniary assistance from Government. The Cossipore Show, which is an institution of growing importance, was held for the fifth time in February 1894, and was well attended. This Department offered prizes at the show for cattle, sugar, dairy produce, and improved agricultural appliances; but except as regards cattle, there were very few entries under these heads, and these even were of poor quality. As in previous years, a number of improved implements and machines were shown in actual work by Messrs. Basu and Banerjei, Assistant Directors, who report that much interest was evinced by spectators in their working. A silk section was organised at this show, as in other years, by Mr. N. G. Mukerji, and agricultural reports and pamphlets were distributed on a large scale to interested visitors of the exhibition.

The exhibition at Kushtia was open from the 3rd to the 10th of March 1894. Mr. Banerjei, who represented this Department at the show, speaks favourably of it, but adds there is much room for improvement in the classification of the exhibits. He remarks that the products which fall under any particular class should be judged *inter se*, and each specimen should be taken on its own special merits, with reference to the purpose for which it is grown, the kind of soil in which it is grown, and the treatment which it has received. This distinction was not observed at the exhibition, where fine and coarse, winter, autumn, and spring varieties of grain were all classed together. Mr. Banerjei further suggests that a portion of the surplus proceeds of the exhibition should be set apart for the purchase of improved seed, which should be distributed among selected raiyats for experimental cultivation. His suggestions and remarks have been communicated to the President of the Exhibition Committee.

The Kalimpong Exhibition, which was held last November, was attended by Captain Gunn, the Superintendent of the Civil Veterinary Department, who assisted in the purchase of mules for the Transport Department. Through the exertions of the Rev. G. H. Graham, a large number of good mules were brought to the exhibition for sale. Of these, 100 were purchased for the Transport Department, among which Captain Gunn reports there were some which came quite up to the standard required for artillery purposes. Bhutia ponies of a good stamp were also brought to the exhibition, but cattle were very poorly

represented, a circumstance which is attributed by Captain Gunn to the outbreak of rinderpest during the *mêla* held in the previous year. The Agricultural Department sent a paddy-thresher and sugar mill for exhibition. The former is said to have been too heavy to be useful for the hills. The sugar mill gave satisfaction.

The Alipur Fair was attended chiefly by traders from Kuch Bihar and Bhutan, though a few traders were attracted from neighbouring districts. It lasted from the 10th to the 31st of January 1894. The fair at Falakata was held from the 10th of February to the 2nd March 1894. It is said that the sales at this fair were less than in former years—a result attributed by the local tahsildar to the large influx of Kabuli traders into the interior, to the increase of rent in consequence of settlement, and to the opening of a rival market by the Kuch Bihar authorities. The Deputy Commissioner of Jalpaiguri remarks that these fairs in the Duars are undoubtedly useful, inasmuch as they encourage trade by bringing new articles of commerce to the notice of the *jotedars*.

Assortments of agricultural appliances were sent to the Faridpur and Kuch Bihar Exhibitions, the working of which are reported to have added to the success of the exhibitions. The Chapra and Pabna Fairs were not assisted by the Department.

SUPPLY OF SEEDS, IMPLEMENTS, MANURES, &c.

62. The following seeds, implements, manures, &c., were distributed by the Department during the year under report, in most cases at cost price:—

Articles.	Number of persons supplied (exclusive of farms).	Quantity.
Seeds—		Mds. s. c.
Jute	11	2 0 0
Dhainchi	1	0 24 0
Tobacco	3	0 0 13½
Oats	4	4 22 0
Maize	1	0 2 8
Sorghum	4	0 13 12
Reana	4	0 12 0
Patna onions	1	0 10 0
Potatoes	25	214 8 0
Cotton	3	0 11 8
Indigo	1	0 2 8
Mahua	1	0 1 2
		No.
Guinea grass cuttings	1	250
		Mds. s. c.
Mangold seed	1	0 1 0
Lucerne	1	0 2 0
		K. p.
Sugarcane cuttings	4	16 9
		Mds. s c.
Buxar wheat	43	180 9 0
Paddy	3	8 0 0
Barley	4	6 35 0
Gram	1	0 10 0
White peas	1	0 10 0
Linseed	1	0 5 0
Khesari	1	0 30 0
Safflower	1	0 8 0
		No.
Coco seedlings	1	200
Implements—		No.
Sibpur plough	5	10
Water-lift	2	2
American hoe	2	5
Potato spade	1	2
Manures—		Mds. s. c.
Bonemeal	3	14 0 0
Castor-cake	4	24 0 0

(Vegetable seeds and grafts and plants obtained from the Botanical Gardens and Agri-Horticultural Society are not included.)

COST OF AGRICULTURAL EXPERIMENTS.

63. The total net cost to Government of agricultural experiments and enquiries conducted under the supervision of the Agricultural Department during the year under report, inclusive of the cost of implements and seed-grain and of the collection and photographing of local agricultural implements, was Rs. 8,895-8-9 against a cost of Rs. 9,864-7-2 during the year 1892-93. This amount is exclusive of the expenditure on the silk experiments and the salaries of the two Assistant Directors.

	Rs.	A.	P.
Maintenance of the Sibpur Farm	2,508	3	0
Experiments other than those made in farms	2,464	7	6
Purchase of implements	565	2	0
Pay of agricultural overseers	740	2	6
Travelling allowance of agricultural overseers ...	403	4	6
Collection and photographing of native implements	415	4	3
Purchase of cattle, &c., for breeding purposes ...	200	5	0
Purchase of Buxar wheat seed	650	0	0
Miscellaneous	948	12	0
Total ...	8,895	8	9

OFFICERS OF THE DEPARTMENT.

64. Messrs. Bhupal Chandra Basu and Nagendra Nath Banerjei have continued to give valuable assistance to the Director in the compilation of agricultural statistics, and have managed the whole of the direct work of agricultural experiment. Mr. Nitya Gopal Mukerji's work in combating silk-worm disease will be separately considered.

I have the honour to be,

SIR,

Your most obedient servant,

W. C. MACPHERSON,

Director of the Department of Land Records and Agriculture, Bengal.

APPENDICES.

	Page.
A.—Mr. Nitya Gopal Mukerji's report on silk experiments	i—ii
B.—Annual Report of the Superintendent of the Civil Veterinary Department, Bengal . .	iii—xxiii

APPENDIX A.

No. 12, dated Berhampore, the 13th April 1894.

From—Babu Nitya Gopal Mukerji, Deputy Collector, on special duty,
To—The Director of the Department of Land Records and Agriculture, Bengal.

I have the honour to submit my Annual Report for the Silk Experiments for 1893-94. The two special reports recently submitted containing most of the facts that would have found place in the Annual Report, there is no occasion to repeat them here and to make this report too long.

2. The following statement indicates the progress of the experiments during the year:—

Year.	Total expenditure.	Expense for rearing only.	Cash receipts.	Quantity of seed sold.	Area of Bengal mulberry in out-stations.	Area of nursery for propagating tree-mulberry.	Number of grown-up plants distributed.
1	2	3	4	5	6	7	8
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Ounces.	Bighas.	Bighas.	
1891-92 ...	8,077 1 9	743 10 0	484 5 0	1,035	9	6	150
1892-93 ...	8,134 2 0	513 3 3	974 9 0	1,900	12	7	2,650
1893-94 ...	7,955 3 0	251 15 6	312 12 6	2,134	15	9	500

3. The cash receipts in the above statement do not represent the amounts realized by the sale of the whole quantity of seed raised, but only of that portion of it which had to be bought up with Government money on the uncertain chance of its getting sold at Berhampore. These amounts also include what was realized by the sale of sulphur and sulphate of copper, which some rearers buy along with the seed for disinfecting rearing houses and appliances; but the amount is very small, being less than Rs. 20 per annum. Some buy these substances from the bazar, and the majority of them do not use them at all.

4. Of the 2,134 ounces of seed sold last year, 1,650 ounces were raised by Dandadhar Das of Kagachira, who sold the quantity for Rs. 1,238. The cocoons he could not dispose of for seed he sold for Rs. 1,114. His actual expenses were less than Rs. 600 during the year. Thus a common cultivator with 7 bighas of mulberry land, by engrafting scientific ideas into his ordinary profession, has been able to establish a net income of about Rs. 150 a month. Other cocoon-rearers of Malda are now anxious to get microscopes and to receive instruction. I have now two more microscopes, and I have begun instructing two Malda rearers, with the object of getting two other seed-rearing establishments set up in this district, failing to get men from other districts.

5. The other stations being situated altogether outside the silk districts, and there being no local market either for 'seed' or silk, these had to depend altogether on my being able to buy up all the cocoons they could produce. For want of funds, I was unable to do this. But men trained both in rearing of silkworms and reeling and spinning of cocoons were supplied to all the out-stations, viz., Kalimpong, Pokhuria, Khulna, Babukhali, and Magura. In the case of the three first-mentioned stations the trained men were paid from the funds of the experiments. At Babukhali and Magura the work is not supported by Government grant. Work was suspended at Khulna last January, owing to the difficulty experienced here in protecting the mulberry from cattle. For Kalimpong, a special grant of Rs. 200-5 was made to the Rev. J. A. Graham for extra expenditure incurred by him in building the rearing house, for which Rs. 150 had been already granted during the previous year. A rearing house was also built at Pokhuria during the year, and for this Rs. 250 was spent. Messrs. Graham and Campbell have associated school children with the experiments at Kalimpong and Pokhuria, with the object of extending sericulture among the peasantry. There is some prospect also of associating the three seed-rearing establishments in Malda, referred to in the last paragraph, with schools. The principal desideratum at present is a text-book to guide the work in all the stations in a systematic manner.

6. The plants distributed among villagers during the previous year were found generally neglected by them, and a fewer number was distributed last year in consequence. Some of the plants from Khulna were removed to Gopalganj in Faridpur, where there is some prospect of sericulture being taken up when the trees planted there last year and the year before have attained large size. Some of the plants from Khulna were also removed to Magura, where a plantation was started, by a native gentleman, of the Bengal shrub mulberry, for immediate use for silk-rearing. At Bangaljhi in Nadia, also, the Rev. Islay W. Charlton has commenced mulberry-planting, with the object of introducing sericulture among Krishnagar Christians. At Barabad near Pokhuria, a poor man has set up a mulberry nursery for propagating large trees, for which he was helped to the extent of Rs. 19.

7. The seed sold in the silk districts has generally given satisfactory results, and in many instances the crops from the experimental 'seed' were used again for seed purposes for three

or four generations successively. A very large quantity of good seed is thus in circulation in the country. A few cases of partial or total failure, however, have been recently reported—one through pebrine and the rest through muscardine. These failures could have been avoided if the rearers followed the right method of work. There are always two conditions that have to be avoided in securing a good crop—diseased seed and local infection. The knowledge how to avoid local infection effectually can be acquired by the rearers only by the slow process of education.

8. The white Erindi or Eria (*Attacus Ricini*) stock was kept up during the year. No demand for the seed of this valuable stock could be created in Assam or in Bogra, where samples were sent for trial. From reports obtained, it seems the experiment was neglected. Mr. Campbell of Pokhuria, however, continues to rear the Eria cocoons for spinning thread out of them; and a piece of cloth he has got woven by his Sonthals looks as good as a piece of Assam-woven cloth.

9. The experiment with the object of introducing European cocoons into this country was continued during the year. The seed was hybernated at the powder magazine of Jalapahar, as dry cold is essential for hybernation. The hatching of the seed has been satisfactory in all the places where the seed was distributed, viz., at Kalimpong, Kagachira, Sujanpur (Punjab), and Kollegal (Madras). At Kalimpong the seed selected out of Mr. Griffitt's Smyrna stock reared at Berhampore in January 1893, is at present being reared, and the cocoons are not yet formed. At Kagachira, half an ounce of imported Italian seed has produced 8 seers of cocoons. The cocoons are of good quality, but a large proportion of the worms died of flacherie, the Bengal mulberry probably being unsuitable for them. At Sujanpur a native cocoon-rearer, Jemail Singh, is rearing the worms from imported Italian seed, hybernated like the other lots at Jalapahar. He has informed that they are in perfect condition at the last stage, no later information being yet received. In Madras, also, the result seems to have been satisfactory. Mr. Hamilton Holmes, who reared them, wrote on the 2nd instant: "I am very pleased with the cocoons formed by the first batch of seed you sent me. They are beautifully white and hard, quite different to anything ever seen here." The seed imported from Mr. Griffitt of Smyrna last February, and reared at Berhampore and Magura, failed entirely, though the hatching was perfect. The failure was caused by flacherie. The seed had got heated *en route* and arrived hatching. The sulphate of copper dip could not be used under the circumstances. A large quantity of Mr. Griffitt's seed is being reared in Kashmir at present. This has been treated with the copper solution, and an opportunity will thus be obtained of judging of the intrinsic merit of this seed, which seemed to me so high after the successful trial with the first sample I had in January 1893.

APPENDIX B.

No. 181 $\frac{\text{V.D.}}{94}$, dated Belgatchia, the 23rd April 1894.

From—Veterinary Captain W. D. Gunn, Superintendent of the Civil Veterinary Department, Bengal,

To—The Director of the Department of Land Records and Agriculture, Bengal.

In submitting my Annual Report of the Civil Veterinary Department, Bengal, for the year 1893-94, I have the honour to point out that it has been arranged, as near as possible, on the lines laid down in Government of India Circular No. $\frac{42}{17}$, dated 28th October 1893, and includes the work done by Civil Veterinary Department, and the Bengal Veterinary Institution. Tabulated statements forming an appendix have been arranged at the end.

Cattle disease.

There have been no epidemics of cattle disease in Bengal during the year under report. From the weekly reports published in the *Calcutta Gazette* it would appear that a cattle disease had broken out in the districts of Monghyr, Faridpur, Singhbhum, Noakhali, Bhagalpur, and Puri, but the deaths seem only to take place during that period when there is a scarcity of food. Cattle during the inundations are nearly starved, and will eat any rank stuff which they can find on the edges of the water. In their emaciated condition this usually brings on fatal diarrhœa and dysentery, and this is usually put down to cattle disease (Contagious).

Moreover, there are four different forms of contagious cattle disease, each having distinctive symptoms, and all more or less fatal. It cannot be expected that very much reliable information on this subject can be obtained and collected until there is an extension of the Civil Veterinary Department into the districts by means of qualified assistants, who would be required to send in weekly statements with special reference to cattle disease. The information which we have now is by no means reliable, nor can it be wondered at, as it is collected by persons who are untrained and quite ignorant of the diagnostic symptoms of the several diseases. It is nevertheless a guide as to the probable number of deaths in herds of cattle, and serves as an indication so as to direct special attention to any district in which the mortality is suspiciously large. A tabulated form is appended marked (A), in which all reports of deaths from cattle disease are marked by letters—F signifying few, V F very few, and S several. The list is made out weekly, so that on the one sheet there is a review of all cases of cattle disease in the year under report. From a glance at this it will be seen that cattle disease is persistent in some districts, notably Faridpur, Singhbhum, Monghyr, Palamau, and Noakhali, but not to such an extent that it could be considered an epidemic or serious outbreak.

Rinderpest was reported to have attacked the working bullocks in the experimental farm at Sibpur in February. I went at once to see the animal then said to be affected, and found it suffering from true rinderpest. One bullock had died two days before with exactly the same symptoms. Fortunately the other animals were isolated, and were able to escape infection. Medicine was sent from the Bengal Veterinary Institution for the sick animal, and also for the healthy ones, but the former died the third day after the attack. No further cases have been reported from this district.

Fortunately I had to deal with intelligent people, who segregated the sick animals, and carried out all my instructions at once, but had this been otherwise, the probability is that we should have had a serious outbreak of cattle plague.

It is in cases of this kind that intelligent veterinary assistants would be of such help to the country, by giving immediate information of the appearance of true contagious disease, and thereby afford the authorities an opportunity of trying to stamp out the affection at the commencement. In the weekly agricultural reports it is only stated "that there are a few cases of cattle disease," this might simply refer to "foot-and-mouth disease." This disease, although of a contagious nature, is not fatal unless the cases are utterly neglected; but much inconvenience is caused when the working animals are attacked, as they are rendered quite incapable of travelling. Often through the impatience of their owners, the animals are made to work, and this frequently results in the separation of the hoofs from their feet, and consequent uselessness of the animal. Should, however, the animals be laid aside and ordinary cleanliness observed, the disease seldom proves fatal or of long duration. The common epidemics among cattle which are recognised by the natives are *kori* and *goa* or *goti*. Animals are also supposed to die from *sannipatrick*, *i.e.*, cold brought on by exposure to wind and rain in bad weather. *Chherka* is a disease like diarrhœa from which cattle die. Kori is said to be like paralysis, in which the cattle lie down and cannot get up again, and die in the course of two or three days. *Goti* is the name given to rinderpest or small-pox.

Cattle reports.

With a view to gather some information with regard to the various breeds of cattle and their management, a demi-official circular was issued to all the district officers, asking them if they would kindly get answers to the following questions:—

1. Suitability of the district for cattle breeding.
2. What are the breeds of cattle or buffaloes?
3. Description of grazing.
4. If stall fed, and on what fodder.
5. General management of cattle.
6. How do the people tell the age?
7. Uses to which the cattle are put.
8. Age at which animals are put to work.
9. Quantity of milk given by cows and buffaloes.
10. What cattle fairs are held in the district?
11. Do cattle owners pay any attention to the bulls?
12. Any other remarks.

For convenience the answers to these questions will have the corresponding numbers.

Up to the present forty answers have been received, and from these it would appear that Bengal generally, and Lower Bengal in particular, is not suitable for cattle breeding, mainly on account of the insufficiency of grazing ground, in consequence of the continually increasing amount of land which is put under the plough. The districts which are said to be the most suitable for carrying on cattle breeding operations are Muzaffarpur, Palamau, Chittagong Hill Tracts, Balasore, North Bhagalpur, Bogra, Backergunge, Rampore, particularly the chars of the Brahmaputra, Patna, Dinajpur, Gaya, Burdwan, Bihar, Midnapore, Dumka, Monghyr, Jalpaiguri, and Barasat. True, the cattle are wretchedly poor, but there is no reason why new blood from a good breed should not do a great deal towards improving the size of the animals in those parts of the country in which grazing grounds are available. Owing to the indifference of the owners, and the poor quality of food which the cattle receive, the breed will no doubt degenerate unless fresh bulls of a good size are continually imported and used. If this were done by the District Boards, a small charge for the service might be made, and this would help to defray the expenses of the keep, &c., of the animal.

There seems to be very few special breeds of cattle, and even these are really cross-breeds, being a mixture of the indigenous small breed of Bengal with imported stock. The Nepali bullocks, which are principally used in the Darjeeling district for cart work, are quite a distinctive breed, and are more like English cattle of the Hereford breed than Indian. Bihari cattle are most in favour for cart work, and large numbers are brought to the large fairs in Lower Bengal and sold for that purpose. They are large, heavy-boned animals, and very suitable for that class of work. The best milch-cows are imported from the North-West Provinces, and are crossed with the sire of the country. The former go by several names, the principal ones being Jumna Pari, Hansi, and Deswali. As half-breeds, they are called Purjunia and Dwasila, and the indigenous breed are known by various local names, principally Desi.

The Sitamarhi breed of Bihar are very handsome animals and shew much quality. They are generally pure white in colour, have fine skin and hair, thin tails, and remarkably good legs. Average height is about 53 inches behind the hump.

There are two, or rather three, species of buffaloes—

(*a*) *Punjabi.*—A very large animal, with short, thick, curly horns, and has been imported.

(*b*) *Arans.*—Have long, large horns, and are said to have a considerable cross of the wild buffaloes, which are to be found in Purnea, and principally along the Kosi river.

(*c*) *Bangie*—Have small horns, and are much less in size than the other two classes.

The first two are much valued, and realize high prices. The males are used for very heavy ploughing and draught work, and the females valued mainly for the large quantity, and richness of their milk.

Generally speaking, there are no pasture reserves, but the animals pick up what they can in the fields after the crops have been cut, and along the sides of roads, nullas, &c. During several months in the year this source is very precarious, as frequently the land is under water for a considerable time, and that which is of a higher level becomes parched up with the sun. In the majority of instances owners of large herds give their animals little else than what they can pick up.

Where forest reserves are available grazing is plentiful, and in such parts as Muzaffarpur, the Chittagong Hill Tracts, Purnea and Chota Nagpur, small breeding farms might be organised, and the young stock sold to the various districts. If properly managed the venture should be remunerative, as there is always a demand for large bulls and good milch-cows.

4. As above stated, the ordinary cattle of the country seldom receive anything other than what they can pick up in the fields and on the roadsides. This mainly consists of coarse grass, creepers, leaves, and dhub grass from the rice-fields. The cart and plough bullocks and milch-cows are specially fed on rice and oat straw, mustard oil-cakes, husks of grain, and occasionally even receive grain.

The usual mode of preparing the food is by cutting the straw up into chaff and filling an earthenware pot with it; on to this is poured a mixture of oil-cake in water, until the chopped straw and husks are thoroughly damped. This mixture is called sanni.

During the rains, when a large portion of the land is under water, cattle receive a small ration of straw.

5. With regard to the general management of cattle in Bengal, the almost universal custom is for several villages to combine, and put a gowala in charge of a certain number of animals, and his duty consists in driving the various herds to the grazing grounds, and prevent them, as much as possible, from straying on to cultivated fields. Each proprietor bears a proportionate share of the cow-keeper's pay. All cattle are either housed, or put into an enclosure during the night to prevent them straying, and as a protection against the incursions of wild animals.

It is said that buffaloes require to be grazed at grey dawn before being milked, and I should think that more milk would be drawn from cows if this practice was extended to them.

6. Throughout the districts the cattle owners seem to be well acquainted with the proper mode of telling the age of animals, viz., by the teeth. When the temporary front incisors are shed, and give place to two permanent teeth, the animal is said to be *dodanta*. Every succeeding year two more teeth are changed, and are then described respectively as *choudanta*, *chhakar*, and *paroṭ*, when the animal reaches the age of six years and has eight permanent incisor teeth.

In some instances the age is said to be determined by the number of knots or rings on the horns, but this must be very uncertain. Moreover, in Dumka the gowalas profess to tell even the number of calves a cow has given birth to by means of the knots in the horns, but this is obviously wrong as bullocks' horns are also corrugated in this manner.

7. The bullocks are generally used for draught work, ploughing, treading grain, and working sugarcane and oilmills. Buffaloes (male) are used in heavy ploughing and heavy draught.

Both cows and female buffaloes are used for breeding and milking, and are also frequently put into the plough when their services are urgently needed.

8. In some parts of the country, directly the animal has received its first two permanent teeth—becomes a *dodonta*—he is put to work. In other parts he is reserved until he is four years old. I should think it very much depends upon the development of the animal, and the urgency for the need of his services, but the average may be taken as between three and four years at which he is put to work.

9. The common breed of Bengal cattle are wretched milkers, and seldom give more than from a quarter to one seer a day. For this purpose cows are imported from up-country, and these, when in full milk, give as much as seven and eight seers a day. The cross-bred cows, which are a mixture of English strain of cattle crossed with the up-country animals may be found at Dinapore and Bankipore, are well known for the richness and quality of milk which they give.

10. A list of fairs will be found in the Appendix (B). Some of them are very large, at which many thousands of cattle are collected, but the majority of cattle exchange is done at the various weekly háts or markets which are held throughout the country.

11. Apparently no attention is paid to the class of bulls used for breeding purposes. Usually a well-grown young male calf is kept, and at the age of about four is turned loose among the herd. Gowalas sometimes keep bulls and bull buffaloes for their own cows, but the general arrangement is that cows are served by the first bull that comes near her, be it young or old, and frequently is served by several. Brahmini bulls, dedicated at the Sradh ceremony to the god Siva, are to be found everywhere. They roam about at perfect liberty, and are mainly responsible for the progeny.

Dinajpur, Mymensingh, and Tippera are making efforts to improve their cattle, and for this purpose have sent to Burma for ten bulls and four cows, the former district having indented for no less than eight bulls and four cows. Except for the purpose of breeding pure Burmans, the cows will not be found to be satisfactory as milkers. I would only recommend the bulls as a cross for the country cows, and would advise the importation either of up-country cows, or Nellore cows from Madras for milking, as these give from five to nine seers a day. I would strongly recommend the establishment of a dairy farm where good animals could be bred and sold either to land-owners, District Boards, or jails. The undertaking would undoubtedly pay its own way, and would be the means of experimenting which were the most suitable animals to cross with the indegenous breed, and be the means of improving the cattle of the country. Until, however, the cattle-owner recognises the necessity for growing cheap crops for his cattle, such as guinea grass, it will be impossible to make very rapid strides in the improvement of cattle; because, no matter how well developed a calf might be, if it does not receive the requisite nourishment, it cannot grow up into a strong, powerful animal. No doubt this is the reason why the cattle in Lower Bengal are so wretched and small.

On 11th August 1893 I visited a portion of the district of Mymensingh, as I was told that a large proportion of cattle for the Commissariat Department came from there. I was then enabled to observe the way in which the cattle were grazed and tied up at night. They could only move about over very small areas, as the whole country was under water, except the banks of the khals and rivers. In many instances the straw which was given to them for the night's consumption had to be placed on a raised bamboo framework to prevent it going into the water. All my tour had to be done by boat, and the following places were visited:—Begumbari, Bahadurpur, Jharia, Durgapur, Nazipur, Toujipuri, Omarpur, Pali, Barwai, Oushan, Parakhanda, and Bahadurpur, and I returned to Mymensingh on 3rd September.

On 18th September I was deputed to attend a veterinary conference at Simla, held on 20th and 28th September 1893, the recommendations of which have been communicated in the Government of India Circular No. $\frac{4}{7}$, dated 27th October 1893.

Travelling.

The following number of miles were travelled by me during the year:—

	Miles.
By rail	5,440
By boat	560
By road	629
Total ...	6,629

Pinjrapole.

The Pinjrapole at Sodpur has been frequently visited by me, and very much improvement has taken place in its management. As now altered, all animals on first admission are put in an isolated plot of ground, where they are kept for a fortnight. If found to be free from contagious disease, they are drafted to the other side of the railway, and are allowed to mix with the main herd. All sick cases are kept aside for treatment, and the contagious wards have been ventilated by means of air pipes in the roofs. All the cases, on my visits, were being well attended and the services of the Veterinary Assistant fully utilized. Plots of ground, which previously were covered with refuse dung, are now cultivated, and are producing excellent crops of guinea grass. The Committee of Management are so pleased with this new source of food-supply that they are going to plant a quantity of it at their other Institution near Raniganj.

Sonpur Fair.

The Sonpur Fair was visited by me on the 16th November 1893. On my arrival there were 2,108 horses and ponies, 89 elephants, 360 cattle.

The number on the 17th increased to 2,560 horses and ponies, 280 elephants, 56 camels, and about 4,000 head of cattle. From the latter date there was further increase of elephants making a total of 390, and a very large number of cattle which it was impossible to count; the probable number must have been over 20,000.

These animals were frequently inspected by my salûtri and myself, and no cases of contagious disease was discovered. Many of the horses had a slight discharge running from their nostrils, but on examination the cases were found to be simple colds.

A few wounds were found on the cattle, but they were of a slight nature. Forty-two cases of diarrhœa occurred, and these animals were kept under observation. They were found to be only simple cases, without any accompaniment of dysentery, or any premonitory symptoms of rinderpest.

The arrangements for watering were very much improved this year, but owing to the difficulty in picketting the cattle in lines, much difficulty was experienced in moving among them.

All the cattle were in good condition and fairly strongly built, but there were only a few which at all come up to the standard requirements for Government purposes. I would recommend that District Boards and large landed proprietors be asked to obtain Mysore bulls which I think would cross well with the class of animals which were here exhibited for sale.

It would be a great help in estimating the progress or decline of these yearly gatherings of animals, if it could be arranged to have registered all the animals which were sold, in a similar manner to that which obtains in the North-West Provinces and the Punjab. This, moreover, would be a protection to both sellers and buyers, and would constitute a voucher that the animals had been really purchased.

I did not think the horses were of such a good class as last year: this would probably be accounted for by the better animals being purchased upcountry for the various native cavalry regiments and police.

I would suggest that the judging of horses should take place as early as possible for the following reasons:—

(*a*) That animals purchased by remount officers are usually bought on the last days of the fair.

(*b*) That as the judging day is generally fixed towards the end of the fair, many good horses are not shown in the prize competitions, as the times for purchasing and judging clash.

(*c*) That the exhibitors are thereby deprived of probable prizes.

This arrangement would be much more convenient for the Judging Committee, and more just to the native dealers, who would then have a chance of winning a prize as well as sell their horses, and there is little doubt that this is a frequent source of discontent.

There were only a few horses of sufficient power and quality suitable for the British service, but there were several really hardy looking animals of the class from which the Bengal Cavalry are taken.

The judging of the horses was held on the 24th and 15th November 1893.

CLASS I.—*Geldings.—Five-year old and upwards.*—They were of a fairly good stamp, but were leggy and heavy topped. The *four and three-year old classes* really contained some good useful animals, and many of them were bought by the Bengal cavalry agents. The *two-year olds and yearlings* were also very good, and would be likely to do well if taken care of.

CLASS II.—*Mares.—Five-year old and upwards.* They were of a very good stamp and showed much power, but the majority of them were disfigured by fat. The *four and three-year olds* were better than the geldings, and showed lots of breeding. I also consider that the animals, speaking generally, were a sounder lot than were exhibited last year.

CLASS III.—*Yearlings.*—This class only brought out five competitors, and it was considered advisable only to award one prize.

I could not ascertain the exact number or other particulars of the remounts purchased, but I do not think there were so many as last year.

The majority of the equine animals in the fair were ponies, so that they were excluded from competing against the horses. I do not know whether they were intentionally debarred, but certainly no animals of pony height came into the ring.

I would suggest, in consideration of the small number of yearlings which competed, and the large number of ponies present, as I did last year, that a class each should be made for mares with foal at foot, and for ponies 13 hands 2 inches and under. Appended is a detailed statement containing the names of the prize winners, amount of prize money, and the numbers of marks obtained by each animal awarded a prize.

Kalimpong fair.

The Kalimpong fair was held on the 28th and 29th November 1893. In my last year's report I mentioned that probably Kalimpong would make a good centre for the purchase of mules for Government, and that if the dealers were convinced that Government would purchase, no doubt the mules would be forthcoming. I interested the Revd. G. H. Graham, the head of the Scotch Mission, in this matter, and he had circulars printed in the vernacular and issued freely. The result of this energy has been quite satisfactory.

A new market has now been opened up, which, if properly worked, ought to supply a want much felt by the Transport Department in Bengal. The circulation of the notices proved a complete success, for where ten mules of an inferior stamp were collected in this mêla in 1892, 158 were brought this year. Of these, 100 were purchased for the transport at an average price of Rs. 143, and among them were some quite up to the standard required for artillery purposes.

As a whole they were of a good, useful, level stamp, with plenty of bone and roomy framework. The feet and legs were remarkably good, the loins broad and powerful, and the depth of girth very noticeable. The girth measurement of some of the mules made as much as 64, and one reached 66, inches. This is remarkably good for animals standing on an average 13 hands 1 inch high, more particularly in this instance, as they were all in poor but hard condition, and probably had seldom tasted the luxury of grain.

All these mules are probably bred in China, and are brought through Tibet into the Darjeeling district with merchandise, and if the purchase money is paid down to the individual owners in hard cash, and without the trouble of having to cash cheques, a ready and good supply will meet the ordinary demand for this animal.

The competition for Bhutea ponies brought out 24, some of which were of a very good stamp. The prizes were very liberal, but I would suggest that in future the smaller prizes be given to animals seven years old and upwards, and the larger amounts be awarded to younger animals. I offer this suggestion in order that owners of young animals may be induced to bring and exhibit them, because young animals are so seldom seen.

The Nepali and Siri cattle were very poorly represented, probably due to the cattle disease (rinderpest) having been so disastrous last year, that the owners were afraid to bring their animals. However, at the next mêla it is hoped that many more cattle will be present.

Bengal Veterinary Institution.

The erection of the buildings of the Bengal Veterinary Institution was commenced on the 20th April 1893, but owing to certain delays, caused principally by the excessive rainy season, it was not completed until the 1st December 1893. The buildings were still, however, so damp that they could not be occupied, and it was not until the 10th January 1894 that the hospital was opened for the admission of patients.

There is now comfortable accommodation for 40 horses and 60 cattle patients, and sufficient space to picket out several others, should there be urgent application for admission of animals. Since the 10th January 1894 50 horses and mules, 53 bullocks, and 3 dogs have been treated in the Institution for various ailments. A detailed list in tabulated form will

be found as an Appendix C—1, 2, 3. All these animals except 9 horses, 36 cattle and 3 dogs were retained in the hospital as in-patients. The daily average of patients treated was 16.

Considering the excellent accommodation for sick animals, and the great care bestowed on them, it is very disappointing that there are not more applications for veterinary relief. The large majority of the animals have been sent by the Transport Department for treatment, the food and attendance having been supplied from the transport depôt at Dum-Dum.

As will be seen by the Appendix (C) three animals were sent for treatment from the Royal Artillery from Barrackpore, and seven from the Tramway Company at Cossipore. As it is essential, in order to give practical instruction, to have as many patients to inspect and examine as possible, it has been considered advisable to obtain practice from any and every source available, so that the students might have experience; and I am pleased to be able to state that the Tramway Company have kindly consented to send any interesting cases to this hospital for treatment on the understanding that, as they supply the feed and attendants, there should be no charge, as is the case with Government animals from the Transport Department. This, I think, is a good arrangement, as I hope we shall then have a considerable number of cases to show the students which we might not otherwise be able to obtain.

So far the natives have been extremely backward in bringing their animals for treatment, and although we have offered to treat their bullocks and feed them while in hospital free of cost, the owners have preferred to take the patients home, and bring them daily for treatment, instead of leaving them in the institution. In one case this was curiously illustrated. The animal was brought for treatment, and found on examination to be extremely ill. Every inducement was offered to the man to leave the animal at the hospital, but without avail. The poor beast was given an anodyne to relieve its distress, and then dragged away by its owner. It fell down about 150 yards away from the hospital and died.

It will probably be some time before the institution becomes properly known to the classes which it is intended to benefit, and in the meantime practice for the students must be obtained from every available source.

The institution is now well equipped with surgical instruments, drugs and appliances, and there is little doubt that when it becomes more widely known, all the stalls will be occupied by patients.

Since the buildings have been completed, several further improvements have been made, the most important of which has been filling in of the tank near the *post-mortem* room. This was very insanitary, and a serious source of danger to the students and servants. It has been proposed that this new plot of ground will be utilized as a garden for growing lucerne, guinea grass, and botanical plants.

Admission of students.

After the publications of the rules and regulations in the Gazette of 3rd January 1894, applications were daily received, until the total number reached 210. As it was only proposed to have 60 students during the first year, this large number had to be weeded out. All applicants were communicated with in writing, asking them to appear on 26th January last. Each individual was examined, and of the total, 66 young men were selected and their names presented to the Board of Management, as candidates who were most suitable as veterinary students. The majority of the applicants were not sufficiently good in the colloquial knowledge of English to enable them to follow the lecturers. On the 23rd February the selected candidates were requested to attend the Institution, but only 30 have apparently any intention of joining the school. It is not understood why all those who were selected have failed to attend the Institution, except that it is possible many of them were disappointed in not receiving a scholarship, nor were they assured of an appointment after passing the full course. But this was specially pointed out to them, that future appointments could not be promised, nor could it be stated what prospects there would be for graduates.

As the session commenced so late, it has been thought advisable to consider this only as a preliminary course, as the session proper really opens on the 23rd June. The names of students who have entered the Bengal Veterinary Institution are attached—*vide* Appendix (D). By the list it will be seen that the majority of them are Hindus.

One, a Muhammadan named Ghyasudin Ahmad, was awarded a scholarship of Rs. 7 by the District Board of Mymensingh, but has not yet attended any of the classes. The attendance of the students has been fairly regular, and they have shown themselves very attentive and eager to try and master the subjects, which must, at first, be extremely difficult for them to understand. By the time-table attached (Appendix E) it will be seen that the whole of the student's time is fully occupied from 8-30 A.M. until 2-30 P.M.

Scholarships.

Fifteen scholarships of Rs. 5 a month each have been offered by Government, which are to be held until the 1st November 1894. It was very difficult to decide to whom these should be given, as it was laid down, as one of the conditions, that the first stipends should be allotted according to the superior educational acquirements. Five of the stipends were awarded to those who had passed the Entrance Examination, but only two of the five have joined the Institution. As there were no means of testing the remaining students except by an examination, it was thought desirable to select 13 who, according to the weekly examinations held in the subjects taught in the Institution, were most advanced. The list of students for proposed scholarships will be found attached (*vide* Appendix F).

Scholarships have also been awarded by the District Boards of Mymensingh and Patna, and the Burdwan Raj has also offered to provide two of Rs. 10 a month each, but so far no one has been sent for instruction.

The Sheo Bux Bogla Scholarship of Rs. 10 a month, founded by Dr. Kenneth McLeod, has not yet been awarded, but Babu Surendro Nath Bose has been recommended for it, on the ground that he has proved to be the most intelligent and hard-working student in the Institution.

In 1887, when the subject of a veterinary school was considered, several large land-owners promised to establish scholarships, and provide work for the successful students afterwards. To these gentlemen a letter was sent, asking if they were still desirous of founding scholarships, or sending candidates for instruction to the Bengal Veterinary Institution. So far, the only satisfactory reply has been from the Manager of the Burdwan Raj Estates, who has promised, as above stated, to send two candidates, and to give them each a stipend of Rs. 10 a month.

Lectures.

At first there was considerable difficulty in obtaining the services of competent veterinary lecturers. The Principal of the Bombay Veterinary College was applied to, but he wrote back saying that no graduate of his college, whom he could recommend, was willing to come for the salary, viz., Rs. 80 a month. However, I have been able to secure the services of Mr. Shroff, a Parsee graduate of that school, and, so far, the students have made fair progress in the subject of physiology in which he lectures.

Babu Hara Dhan Dutt, a graduate of the Calcutta Medical School, lectures on Materia Medica and Therapeutics, and has likewise taught the students in a satisfactory manner.

Both of these lecturers have been appointed on probation for a period of six months, and if they continue their work in the same satisfactory manner, I trust their appointments may be made permanent. Attached to this report in the Appendices (G. H. I. K.) will be found a syllabus of the lectures on anatomy, materia medica, and therapeutics, physiolgy, and the exterior of the horse, by which it will be seen that the students are receiving a thorough grounding in the elementary portion of these subjects.

At the end of every week a *viva voce* examination is held in each subject, and any point that the students seem not to have thoroughly grasped is again minutely explained to them.

All students are taken round the cases in the hospital, and a certain number are appointed as clinical clerks, whose duty it is to personally dress all wounds, and to attend to certain cases allotted them under the supervision of the Assistant Superintendent and Hospital Assistant.

I am very pleased to report that I have no difficulty with the students in their attendance, help at operations and *post-mortem* examinations. This is a matter of very great importance, as there might have been some difficulty in at first inducing them to help at certain details in surgery which might have been unpleasant to them. So far the students have worked intelligently and willingly, and will in all probability turn out to be useful veterinary assistants.

Hospital.

The hospital has not filled with patients as well as was first anticipated, and considering that there is accommodation for 100 patients, and unequalled facilities for the treatment of sick animals, it is somewhat disappointing to find that owners of cattle and ponies do not take advantage of this institution; still, as a commencement, a total of 106 admissions (*vide* Appendix C) may be considered to be fairly satisfactory. This number would give a daily average of about 16 animals, among which were many interesting cases. A detailed list from the commencement—10th January to 31st March—is appended (as parts of Appendix C). It will be noticed that a considerable number of these animals belonged to the Transport Department of the army, and were all affected with disease of a severe character. The mules were all affected with *lymphangitis*, a disease which in many respects resembles *farcy*. These animals have been placed in the isolation wards, and the disease is undergoing a thorough investigation, the results of which will be embodied in a report. So far the disease has proved to be not infectious, and should this be ultimately proved beyond all doubts, it will cause a saving of thousands a year to Government and the country; as, heretofore, the disease has been considered as allied to glanders.

With regard to the deficiency of practice there are several factors which help to keep away persons from bringing their animals, the most important of which, I believe, are:—

(*a*) the charges are too high,
(*b*) the owners are distrustful of leaving their animals in the hospital.

With regard to the charges, especially that in class I of Re. 1-8 a day, I have had several complaints, particularly when the animals have been in hospital for some time, that the total sum has been excessive. With regard to this matter I have consulted the charges made in the Bombay Veterinary College, and find that they also have had to reduce their original fees.

The following is an extract from their scale of fees for patients as now charged in the Bombay Veterinary College:—

"For horses and bullocks belonging to the public conveyances plying for hire in the city of Bombay the charges are—

Annas 6 per day for a horse.

Annas 3 per day for a bullock for food only. Attendance, treatment, medicine, and stabling are supplied free.

For paying patients, *i.e.*, for animals belonging to private individuals, the charges are—

Annas twelve per day for a horse.

Annas eight per day for a bullock.

Annas three per day for a dog for food only.

Attendance is to be supplied by the owner and moderate charges made for medicines consumed in each case.

The charges in this Institution are:—

	Rs.	A.	P.	
I.—Horses and ponies belonging to well-to-do owners ...	1	8	0	each.
II.—Horses belonging to hackney carriage owners ...	0	12	0	„
Ponies ditto ditto	0	8	0	„
III.—Cattle belonging to well-to-do owners	0	8	0	„
IV.—Cattle belonging to cartmen, gowalas, or drivers of pack bullocks	0	4	0	„
V.—Cattle belonging to persons who are unable, in the opinion of the Superintendent, to pay fees ...	Free.			

I think that the rates recommended in my letter to the Committee of Management, dated 19th March 1894, viz.—

	Rs.	A.	P.
I.—Horses and ponies belonging to well-to-do owners ...	1	0	0
II.—Horses belonging to hackney carriage owners ...	0	8	0
Ponies ditto ditto	0	6	0
III.—Cattle belonging to well-to-do owners	0	6	0
IV.—Cattle belonging to cartmen, goalas, or drivers of pack bullocks	0	3	0

would make them somewhat similar to those pertaining in the Bombay Veterinary College, and would not deter owners from sending their animals for treatment. In the Lahore Veterinary School the system is that the owners feed their own animals while in hospital, and a fee for medicine is charged according to the position of the owner and the duration of the case.

With regard to factor (*b*) this will, I hope, only be a matter of time, and when the people recognise that we take every care of their animals, and really do them good, they will no doubt become more trustful.

As a matter of inducement I have taken all cattle belonging to cartmen into the hospital free of cost, so that the name and work of the Institution might be freely circulated, and thus cause others to bring the animals.

The sum of fees earned by the hospital up to 31st March was Rs. 343-12, which more than covered the expenses of feeding, viz., Rs. 147-7-6 of all the animals admitted.

Considering the short time the school has been opened, a large number of operations have been successfully performed in the operation theatre, a list of which is appended (L), and in casting the animals the students are invariably employed. This will give them considerable practice in handling and securing animals.

All operations are performed under the influence of anesthetics, and therefore no animal is put to needless pain.

Considerable difficulty has been experienced in establishing a shoeing forge, as the workmen demand much higher pay than we had anticipated. I am, however, in negotiation with some up-country men, and should they accept the terms offered, we shall then be in a position to shoe horses, and make our own shoes in the forge, which has recently been fitted up for the purpose.

In connection with the forge I would suggest the advisability of having a "crush" erected, in order that all bad tempered and restive animals might be fixed in it while being handled. This precaution will probably prevent many serious accidents, and be also a very great and safe help to those who are handling the animal. The cost would not be more than Rs. 30 or Rs. 40, and could be met out of the contingent allowance for the year.

The hospital establishment consists of—

1 Hospital Assistant,	3 Malis,
1 Compounder,	1 Durwan,
1 Shoeing smith,	2 Syces,
1 Bearer,	3 Sweepers,
2 Bhistees,	

which is rather less than the sanctioned number, but it was only considered necessary to entertain the numbers which were absolutely required. As the number of patients increases the extra establishment will be taken on.

As the actual work of the hospital and school commenced very late in the financial year, a considerable saving in the budget allotment from the non-entertainment of the establishment was effected. From this saving instruments, furniture, drugs, a plot of land, &c., were purchased, a tabulated statement of which will be seen in Appendix M.

With regard to the deficiency of patients admitted into the institution hospital, I would suggest that all animals, whose owners have been convicted of cruelty to them by working

them in an unfit state, should be sent to the Bengal Veterinary Institution for treatment. The idea of the existence of the Society for the Prevention of Cruelty to Animals is, I take it, to extend a kind and helping hand to animals, and not to mulct owners by fines. Why not, if the animal requires medical or surgical aid, insist upon the owner leaving it at the institution until it is fit for work again, the owner defraying the expenses of its keep. This I believe is the plan on which the Bombay section of the Society works.

This would indeed be a boon to many poor animals who very seldon benefit by the prosecution of the owners, and would afford considerable practice to the students in the institution.

In conclusion I would beg to state that Mr. Edmund Burke has rendered me very considerable help in the organization of the Bengal Veterinary Institution, and that in him the students have a very able and patient lecturer in anatomy.

W. D. GUNN, VETERINARY CAPTAIN,

Supdt., Civil Veterinary Dept., Bengal.

APPEN

Statement showing the occurrence of cattle disease in the districts of Bengal as

Districts.	Dates of																										
	April.				May.					June.				July.				August.					September.				
	5th.	12th.	19th.	26th.	3rd.	10th.	17th.	24th.	31st.	7th.	14th.	21st.	28th.	5th.	12th	19th.	26th.	2nd.	9th.	16th.	23rd.	30th.	6th.	13th.	20th.	27th.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Hooghly ...	F.	F.	N.	S.	F.	...	F.	V.F.	...	...	...	...	...	...	...	...	...	...	...	...	...	F.	...	...	...	...
Jessore ...	F.	F.	...	...	...	...	F.	F.	...	F.	...	...	...	...	...	F.	F.	F.	...	...	F.	F.	F.	F.	...	...
Noakhali ...	F.	...	F.	...	...	F.	...	...	...	...	...	...	...	...	S.	S.	S.	..	S.	F.	...	F.	F.	S.	S.	...
Mymensingh ...	F.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Malda ...	F.	...	...	S.	F.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Palamau ...	S.	S.	F.	F.	F.	...	F.	...	...	...	F.	F.	F.	...	S.	F.	...	...	...	F.	V.F.	F.	V.F.	...	...	...
Monghyr ...	...	S.	F.	...	...	...	...	F.	...	F.	F.	...	...	...	...	...	...	...	F.	F.	F.	S.	F.	F.	F.	F.
Shahabad ...	...	S.	S.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
24-Parganas ...	...	...	F.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Faridpur ...	...	...	F.	F.	S.	S.	F.	F.	F.	F.	F.	F.	F.	V.F.	V.F.	V.F.	V.F.	F.	F.	F.	F.	F.	F.	F.	F.	F.
Singhbhum ...	...	...	F.	...	F.	...	F.	F.	F.	F	F.	F.	F.	F.	F.	F.	F.	F.	F.	F.	F.	F.	...	F.	...	F.
Birbhum ...	...	...	...	F.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Nadia ...	...	...	...	F.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Murshidabad...	...	...	...	...	...	F.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Hazaribagh ...	...	..	...	...	...	F.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Khulna ...	...	...	...	...	...	...	...	F.	...	...	F.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Rajshahi ...	...	...	...	...	...	...	...	F.	...	...	...	...	...	...	...	...	...	...	...	..	...	...	...	...	...	...
Muzaffarpur ..	...	...	...	...	...	...	...	F.	...	...	...	...	...	...	F.	S.	V.F.	...	...	...	...	...	...	...	F.	...
Chittagong ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Darjeeling ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	F.	...	...	...	...	...	...	...	...	...	...	...
Purnea ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	F.	...	V.F.	...	...	...	...	...
Midnapore ...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	F.
Sonthal Parganas.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	F.
Hazaribagh ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...		...	...	...	...	...	...	...	...	...	...	...
Bhagalpur ...	...	...	...	...	...	...	...	...	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Dacca ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Puri ...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

Note.—F.—
,, S.—
,, V.F.—

DIX A.

published in the Calcutta Gazette *from* 1*st April* 1893 *to* 31*st March* 1894.

GAZETTE.

October.				November.					December.				January.					February.					March.			
4th.	11th.	18th.	25th.	1st.	8th.	15th.	22nd.	29th.	6th.	13th.	20th.	27th.	3rd.	10th.	17th.	24th.	31st.	7th.	14th.	21st.	28th.		7th.	14th.	21st.	28th.
28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
V.F.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	F.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	V.F.	F.	V.F.	V.F.	...	V.F.	...	...	V.F.	V.F.	V.F.	...	V.F.	F.	V.F.	...	V.F.	V.F.	...	...	...	...	F.	...	...	...
S.	F.	S.	S.	S.	S.	F.	F.	F.	...	...	...	...	F.	...	F.	...	...	...	F.	...	...	...	F.	...	...	F.
...	S.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
F.	F.	F.	F.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	F.	F.
F.	F.	F.	F.	F.	...	...	...	F.	...	...	F.	...	...	...	...	...	...	...	...	S.	...	...	S.	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	F.	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
F.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	F.	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
F.	F.	...	...	F.	F.	...	...	V.F.	V.F.	...	V.F.	...	...	V.F.	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	F.	F.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
F.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
F.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	S.	S.	S.	...	...	S.	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	V.F	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...	S.	...	...	...	...	...	...	...	F.	F.	...	F.	...	F	F.	F.	F

Few.
Several.
Very few.

APPENDIX B.

List of Fairs.

Serial No.	Districts.	Fairs.	Remarks.
1	2	3	4
1	Dinajpur ...	(1) Nekmard, (2) Alwa Khuna, (3) Dhundhuni, (4) Bechorgory.	
2	Purnea ...	(1) Jollakhan, (2) Khugra.	
3	Midnapore ...	(1) Dhungadi, (2) Dushgram.	
4	Dumka ...	Hyla.	
5	Champaran ...	Bethia.	
6	Darjeeling ...	(1) Teesta, (2) Kalempong, (3) Singla.	
7	Birbhum ...	(1) Mabirnul bazar and Krishnanagar.	
8	Burdwan ...	Pechundi.	
9	Gaya... ...	(1) Beswa mêla, (2) Punia, (3) Rafiganj.	
10	Rangpur ...	(1) Darwani, (2) Panga, (3) Barubhita, (4) Nilphamari, (5) Gaibanda, (6) Basudebpur, (7) Kondin, (8) Shahebganj, (9) Lalbagh.	
11	Bogra ...	(1) Mohasthun, (2) Gopinathpur, (3) Dupchanchia, (4) Pakour, (5) Chundanbaisha.	
12	Shahabad ...	Barhumpur.	
13	Palamau ...	(1) Balunath, (2) Hirbanj, (3) Chakla, (4) Bare Rampur, (5) Kurid, (6) Raksi, (7) Daltonganj.	
14	Saran ...	(1) Sonepore.	
15	Muzaffarpur ...	(1) Sitamarhi, (2) Ramnonine, (3) Bhairoasthan.	

APPENDIX C.

Statement showing the number of animals treated in the Bengal Veterinary Hospital from 10th January to 31st March 1894.

Description.	In-patients—							Out-patients—							Grand total.	Remarks.
	Admitted.		Discharged.		Remaining under treatment.		Total.	Brought for treatment.		Discharged.		Remaining under treatment.		Total.		
	Government.	Private.	Government.	Private.	Government.	Private.		Government.	Private.	Government.	Private.	Government.	Private.			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Horse ...	14*	27†	...	19	14	8	41	...	9	...	9	...	...	9	50	
Cattle ...	5	12	2	12	3	...	17	...	36	...	34	...	2	36	53	
Dog ...	...	...	...	...	...	...	...	...	3	...	3	...	...	3	3	
Total ...	19	39	2	31	17	8	58	...	48	...	46	...	2	48	106	

* Battery horses 3.
Transport mules 11.
† Tramway horses 7.

APPENDIX C1.

Statement showing the number of horse patients belonging to Government and private individuals treated in the Bengal Veterinary Institution of various diseases and injuries from 10*th January to* 31*st March* 1894.

Diseases.	In-patients—												Out-patients—												Grand total.	Remarks.
	Admitted.		Cured.		Relieved.		Died.		Remaining.		Total.		Brought for treatment.		Cured.		Relieved.		Died.		Remaining.		Total.			
	G.	P.	G.	P.	G.	P.	G.	P.	G.	P.	G.	P.	G.	P.	G.	P.	G.	P.	G.	P.	G.	P.	G.	P.		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
Abscess ...	...	2	...	2	...	...	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	2	
Oedema ...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	1	1	
Bursati ...	...	2	...	...	...	...	...	...	...	2	...	2	...	1	...	1	...	...	...	...	...	...	...	1	3	
Catarraith ...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	1	...	1	1	
Congestion of liver.	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	1	1	
Colic ...	...	1	...	1	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	
Coronitis ...	...	3	...	1	...	1	...	...	...	1	...	3	...	...	...	...	...	...	...	...	...	...	...	...	3	
Cystic tumour ...	...	1	...	...	...	...	...	...	...	1	...	1	...	2	...	...	...	2	...	...	...	...	...	2	3	
Exostosis metacarpal.	...	1	...	...	...	1	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	
Exostosis phalangeal.	...	2	...	...	...	2	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	2	
Filaria oculi ...	...	2	...	2	...	...	...	...	...	...	...	2	...	2	...	2	...	...	...	...	...	...	...	2	4	
Febricula ...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	1	1	
Hœmorrahagic nodules.	...	1	...	...	...	1	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	
Laminitis ...	...	2	...	...	...	1	...	...	...	1	...	2	...	...	...	...	...	...	...	...	...	...	...	...	2	
Lymphangitis	14	...	...	...	...	...	...	...	14	...	13	1	...	...	...	...	...	...	...	...	...	...	...	...	14	
Canker ...	1	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1	
Paraplegia ...	...	2	...	...	...	2	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	2	
Sprains ...	...	3	...	2	...	1	...	...	...	...	...	3	...	...	...	...	...	...	...	...	...	...	...	...	3	
Sand crack ...	...	1	...	1	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	
Synovitis ...	...	1	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	
Wound ...	...	2	...	1	...	...	...	...	...	1	...	2	...	...	...	...	...	...	...	...	...	...	...	...	2	
Total ...	15	26	...	10	...	9	...	...	15	7	14	27	...	9	...	6	...	2	...	...	...	1	...	9	50	

APPENDIX C2.

Statement showing the number of cattle patients belonging to Government and private individuals treated in the Bengal Veterinary Institution from 10*th January to* 31*st March* 1894.

Abscess ...	1	...	...	...	...	...	...	...	1	...	1	...	1	...	1	...	...	...	...	...	...	1	...	2		
Anæmia ...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	1	1		
Ankylosis ...	...	1	...	...	...	1	...	...	...	...	...	1	...	...	..	...	...	...	...	...	...	...	...	1		
Contusion ...	...	2	...	2	...	...	...	...	...	...	...	2	...	6	...	6	...	...	...	...	...	...	...	6	8	
Fever, simple ..	...	...	...	...	...	...	...	...	...	...	...	...	...	4	...	4	...	...	...	...	...	...	...	4	4	
Fracture ...	...	2	...	...	...	...	...	2	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	2	
Irregular teeth (molars).	1	...	1	..	...	...	...	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1	
Influenza ...	2	3	...	1	...	1	1	1	1	...	2	3	...	2	...	2	...	...	...	...	...	...	...	2	7	
Ophthalmia ...	...	...	...	...	...	...	...	...	...	...	...	...	...	3	...	...	...	2	...	...	...	1	...	3		
Pneumonia ...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	1	...	...	...	1	1	
Periostitis ...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	1	1	
Ringworm ...	...	...	...	...	...	...	...	...	...	...	...	...	1	4	1	3	...	...	...	...	...	1	1	4	5	
Sprain ...	...	2	...	...	...	2	...	...	...	...	...	2	...	...	...	...	...	...	...	...	...	...	...	...	2	
Tuberculosis ...	1	...	...	...	...	...	...	...	1	...	1	...	...	...	...	...	...	...	...	...	...	...	...	...	1	
Tumour ...	...	...	...	...	...	...	...	...	...	...	...	...	...	1	...	...	...	...	...	...	...	1	...	1	1	
Wound ...	...	1	...	1	...	...	..	..	...	...	...	1	...	...	...	...	...	...	...	...	...	...	...	...	1	
Yoke gall ...	...	1	...	...	...	1	...	...	...	...	...	1	1	10	1	10	...	...	...	...	...	...	1	10	12	
Total ...	5	12	1	4	...	5	1	3	3	...	5	12	3	33	3	27	...	2	...	1	...	3	3	33	53	

Note—"G" Government.
"P" Private.

APPENDIX C3.

Statement showing the number of dogs treated as out-patients in the Bengal Veterinary Institution from the 10th January to 31st March 1894.

Disease.	Admitted.	Cured.	Relieved.	Died.	Remaining.	Total.	Remarks.
1	2	3	4	5	6	7	8
Mange (follicular)	1	...	...	...	1	1	
Wound ...	2	2	...	...	...	2	
Total ...	3	2	...	...	1	3	

APPENDIX D.

Statement showing the number of students enrolled in the Bengal Veterinary Institution and the number of lectures attended by each up to the 31st March 1894.

Serial No.	Name.	Caste.	Residence.	Number of lectures attended by each.					Remarks.
				Anatomy.	Physiology.	Exterior of the horse.	Materia medica.	Handling animals.	
1	2	3	4	5	6	7	8	9	10
1	R. L. Bhattacharya	Hindu ...	Calcutta ...	23	13	6	23	23	
2	S. C. Pal ...	Do. ...	Ditto ...	23	13	6	23	23	
3	P. K. Bose ...	Do. ...	Ditto ...	23	13	6	23	23	
4	S. N. Bose ...	Do. ...	Ditto ...	23	13	6	23	23	
5	I. N. Dutt ...	Do. ...	Ditto ...	23	13	6	23	23	
6	H D. Banerjee ...	Do. ...	Ditto ...	23	13	6	23	23	
7	B. B. Dutt ...	Do. ...	Ditto ...	23	13	6	20	23	
8	U. N. Mitra ...	Do. ...	Ditto ...	23	13	6	21	23	
9	I. M. Mukherji ...	Do. ...	Burdwan ...	23	13	6	23	23	
10	S. C. Sanyal ...	Do. ...	Bhagalpur ...	22	12	5	22	22	
11	S. N. Mitra ...	Do. ...	Calcutta ...	21	12	6	21	21	
12	H. A. Stuart ...	Christian ...	Ditto ...	21	11	3	19	20	
13	B. B. Chandra ...	Hindu ...	Hooghly ...	20	13	5	19	20	
14	H. P. Dass ...	Do. ...	Khulna ...	19	11	5	19	19	
15	B. K. Banerjee ...	Do. ...	Calcutta ...	19	10	5	18	19	
16	K. N. Dutt ...	Do. ...	Ditto ...	18	11	5	18	18	
17	N. L. Gupta ...	Do. ...	Ditto ...	18	10	5	17	18	
18	M. Mittra ...	Do. ...	Ditto ...	18	9	4	18	18	
19	T. D. Mitra ...	Do. ...	Ditto ...	18	11	5	19	18	
20	Hira Lal ...	Do. ...	Bankipore ...	18	12	5	19	18	
21	B. B. Neogi ...	Do. ...	Calcutta ...	17	9	4	17	17	
22	S. C. Mookerjee ...	Do. ...	Ditto ...	17	8	4	17	17	
23	M. L. Mitter ...	Do. ...	Ditto ...	16	10	5	17	16	
24	H. K. Bose ...	Do. ...	Ditto ...	16	8	5	16	16	
25	S. Rudra ...	Do. ...	Ditto ...	14	8	3	14	14	
26	S. N. Dey ...	Do. ...	Ditto ...	13	8	5	12	13	
27	C. B. Mukerjee ...	Do. ...	Khulna ...	12	6	4	12	12	
28	K. L. Chatterjee ...	Do. ...	Calcutta ...	8	6	1	11	8	
29	K. P. Mullick ...	Do. ...	Ditto ...	8	5	2	8	8	
30	Z. A. Zahin ...	Muhammadan	Ditto ...	8	5	4	9	8	
31	S. P. Singh ...	Hindu ...	Bankipore ...	6	5	2	7	6	
32	N. N. Sur ...	Do. ...	Calcutta ...	4	1	1	3	4	
33	A. D. Biswas ...	Do. ...	Ditto ...	3	1	1	3	3	
34	R. C. Sircar ...	Do. ...	Ditto ...	2	1	1	2	2	
35	B. B. Dey ...	Do. ...	Ditto ...	1	1	1	...	1	

APPENDIX E.

Time-table.

Hour.	Monday.	Tuesday.	Wednesday.	Thursday.	Friday.	Saturday.	Remarks.
1	2	3	4	5	6	7	8
8 A.M. ...	Hospital practice	H. P. ...	H. P. ...	H. P. ...	H. P. ...	H. P. ...	
9 „ ...	Anatomy ...	Anatomy ...	Anatomy ...	Anatomy ...	Anatomy ...	Examination	
10 „ ...	Compounding ...	Compounding	Farriery ...	Compounding	Compounding	Farriery ...	
11 „ ...	Materia medica	Materia Medica	Botany ...	Materia medica	Materia medica	Examination	
12 noon ...	Operations and practical handling of animals.						
2.30 P.M. ...	Physiology ...	Exterior of the horse.	Physiology ...	Exterior of the horse.	Physiology ...	*	* Half holiday.

APPENDIX F.

List showing the names, residence, and qualifications of the students recommended for stipends.

Serial No.	Names.	Residence (district).	Qualifications.
1	2	3	4
1	Ram Lal Bhattacharjee	Calcutta ...	Passed the Entrance Examination.
2	Bankim Behari Chundra	Hooghly ...	Ditto ditto.
3	Satish Chunder Sanyal	Bhagalpur	Ditto ditto.
4	Krishna Nath Dutt	Calcutta ...	Read up to the Entrance Examination.
5	Sarat Chunder Pal	Do. ...	Ditto ditto.
6	Protul Krishna Bose	Do. ...	Ditto ditto.
7	Jotindro Nath Dutt	Do. ...	Ditto ditto.
8	Nondo Lal Gupta	Do. ...	Ditto ditto.
9	Satyandro Nath Mitra	Do. ...	Ditto ditto.
10	Herbert A. Stuart	Do. ...	Ditto ditto.
11	Hurry Das Banerjee	Do. ...	Ditto ditto.
12	Benode Behari Dutt	Do. ...	Ditto ditto.
13	Upendra Nath Mittra	Do. ...	Ditto ditto.
14	Jotindro Mohun Mookerjee.	Do. ...	Ditto ditto.
c 15	Bemul Krishna Banerjee	Do. ...	Ditto ditto.
16	Surendro Nath Bose	Do. ...	Recommended for the Sheo Bux Bogla Scholarship.

APPENDIX G.

Syllabus of anatomy taught up to the 31st March 1894.

Introduction.

(1) Anatomy.
(2) Zootomy.
(3) Phytotomy.
(4) Special anatomy.
(5) Comparative anatomy.
(6) Histology.
(7) Developmental or embryological anatomy.
(8) Morphological anatomy.
(9) Systematic or descriptive anatomy.
(10) Surgical or topographical anatomy.
(11) Practical anatomy.
(12) Morbid or pathological anatomy.
(13) Veterinary anatomy.

Osteology.

(14) Bones—definition, composition, and uses.
(15) Classes of bone—long, flat, and irregular.

(16) Structure of bone—compact tissue, cancellated tissue, concentric lamellæ, interstial lamellæ, peripheral lamellæ, Haversian system, lacunæ, canaliculi, cancelli, diploë, medullary canal, etc.

(17) The skeleton—Artificial and natural.

(18) Divisions of skeleton—Axial and appendicular skeleton.

(19) Divisions of axial skeleton—skull and trunk or vertebral column.

(22) Subdivisions of axial skeleton—cranium and face; cervical, dorsal, lumbar, sacral and caudal regions.

(21) Divisions of appendicular skeleton—Pectoral arch and limbs, and pelvic arch and limbs.

(22) Number of bones in skeleton of horse—

256 Pieces with teeth and auditory ossicles.
216 „ without the teeth.
212 Bones with "Hyoid" as single bone.
204 Whole bones excluding the auditory ossicles.

(23) Number of bones in the various regions of the skeleton of the horse—

"Skull" (39 bones, teeth excluded).
- Cranium = 18 with auditory ossicles (4 single and 7 pairs).
- Face = 21 without and 61 with teeth (3 single and 9 pairs.)

Vertebral column or trunk (87 bones).
- Cervical region = 7
- Dorsal „ = 55 (D. vertebræ 18; Ribs 36; Sternum 1)
- Lumbar „ = 6
- Sacral „ = 1
- Caudal „ = 18

Pectoral limbs = 42 bones (21 in each).

Pelvic arch and limbs = 44 bones (6 in pelvis and 19 in each limb).

(The horse's skeleton, as here considered, consists of 212 bones).

(24) Cranial bones—Occipital, wormian, sphenoid, and ethmoid, single; and parietal, frontal, temporal, malleus, incus, stapes and os orbiculare, pairs.

(25) Facial bones—Vomer, Hyoid and inferior maxilla, single; and nasal, lachrymal, malar, superior maxilla, premaxilla, palatine, pterygoid, superior turbinal and inferior turbinal, pairs.

(26) Cranial cavity—General considerations of.

(27) Facial sinuses—Frontal, superior maxillary, inferior maxillary, sphenoidal, and ethmoidal.

(28) Nasal fossæ—General considerations.

(29) Foramina of the head—Foramen magnum, condyloid foramen, foramen lacerum basis cranii, parieto-temporal canal, internal auditory meatus, external auditory meatus, aqueduct of fallopius, aqueduct of cochlea, aqueduct of vestibule, stylo-mastoid foramen, styloid foramen, eustachean opening, pterygoid foramen, vidian canal, orbital hiatus, or group consisting of eight foramina, viz., 1st optic foramen, 2nd internal orbital foramen, 3rd foramen lacerum orbitale, 4th foramen rotundum, 5th pathetic foramen, 6th temporal foramen, 7th pterygoid foramen, and 8th vidian canal. Supra orbital foraman, olfactory foramen, maxillary hiatus consisting of three foramina, viz., 1st superior palatine, 2nd sphenopalatine, and 3rd superior maxillary. Lachrymal fossa and canal, inferior palatine foramen, palatine canal, inferior orbital foramen, superior dental canal, incisor foramen, incisor cleft, inferior maxillary foramen, mental foramen, and inferior dental canal.

E. BURKE,

Asst. Supdt., Bengal Veterinary Institution.

APPENDIX H.

Syllabus of Materia medica taught in the preliminary class of the Bengal Civil Veterinary Institution ending 31*st March* 1894.

1. Materia medica defined. Sources of drugs.
2. Mineral medicines, vegetable medicines, and animal medicines explained and exhibited.
3. Division of materia medica into pharmacology, therapeutics, and pharmacy explained
4. Action of medicines—

(*a*) Local.
(*b*) General action defined.
(*c*) Physiological action, therapeutical action, and toxic action of medicines.
(*d*) How the general action of the medicines obtained, process of absorption of medicines explained, and how medicines enter into the circulation.
(*e*) Endosmosis and exosmosis.
(*f*) Especial affinity of the different drugs into different organs.
(*g*) How the action of medicines is modified, and under what circumstances.

(*h*) How the medicines are passed out from the system.
(*i*) The action of medicines upon the influence of climate and temperature, as well as upon the development of different organs of different species of domesticated animals.
(*j*) Habit, idiosyncrasies, and surroundings of the patients modify the action of medicines.

5. Weights and measures, their uses and symbols.
6. Reading and writing prescriptions.
7. General guidance and table of doses of medicines for different domesticated animals.
8. Different modes of administration of medicines to the domesticated animals—
   (*a*) Balls, their preparation and administration.
   (*b*) Drenches, draughts, or drinks, their preparation and administration.
   (*c*) Injections, enemeta.
   (*d*) Hypodermic injection.
   (*e*) Endermic method of administration of medicines.
   (*f*) Inhalation.
   (*g*) Intravenous, intratrachial administration of medicines.
   (*h*) Administration of medicines through skin by absorption.
9. Definitions and names of actions of each class of medicines—
   (1) Adhesives, (2) Alteratives, (3) Anæsthetics, (4) Anodynes, (5) Antacids, (6) Antemetics, (7) Anthelmintics, (8) Antidotes, (9) Antilithics, (10) Antiparasitics, (11) Antiperiodics, (12) Antipelogostics, (13) Antiseptics, (14) Antispasmodics, (15) Aperients, (16) Aromatics, Cordials, Carminatives, (17) Arterial Sedatives, (18) Astringent, (19) Aphrodisiacs, (20) Anaphrodisiacs, (21) Cathartics, Purgatives, (22) Caustics, Corrosives, Escharotics, (23) Chalybeetes, Hœmatinics, (24) Cholagogues, (25) Counterirritants, Irritants, (26) Demulcents, Emollients, (27) Deobstruents, (28) Deodorizers, (29) Derivatives, Revulsives, Epispatics, Vesicants, Rubifacients Pustulanto, (30) Desiccants, (31) Diaphoretics, Sudorifics, (32) Disinfectants, (33) Discutients, Resolvents, (34) Diuretics, (35) Drastics, (35) Ecbolics, Parturiants, (37) Emetics, (38) Stimulants, Excitants, (39) Febrifuges, (40) Hæmostatics, Styptics, (41) Hydrogogues, (42) Hypnotics, Soporifics, Narcotics, (43) Lanatives, (44) Lactagogues, Galectagogues, (45) Nutritives, (46) Refrigerents, (47) Sedatives, (48) Sialagogues, (49) Tonics, (50) Vermifuge, (51) Vermicides, (52) Lectifuge, (53) Expectorants, (54) Emmenagogues.
10. Description of medicines with their actions, uses, doses, &c., &c.
11. Accacia, Gucossi, Gum, Accacia, Mucilage of Accacia.
12. Acetum, Vinegar.
13. Acidum Aceticum, Acetic acid.
14. Acid Aceticum, Dil.
15. Acid Aceticum, Glaciale.
16. Acid Arseniosum (white arsenic).

BELGATCHEA,
The 18*th April* 1894.

HARADHAN DUTT,
Teacher of Materia Medica.

APPENDIX I.

Syllabus of Physiology taught in Class A for the short preliminary session ended 31*st March* 1894.

1. Physiology defined. Its relation to other allied branches of natural science.
2. Matter, Molecules, atoms.
3. Difference between plants and animals.
4. The blood—
   Physical characters of the blood.
   Chemical composition of the blood.
   Coagulation.
   The extractives of the blood.
   The difference between arterial and venous blood.
   The salts of blood.
   The quantity of blood.
   The gases of blood.
   Organisms in blood.
   Uses of the blood.
5. The circulation of the blood—
   a. The heart—
   The pericardium.
   The chambers of the heart.
   Structure of the heart.
   Course of the blood through the heart.
   The valves of the heart.

The action of the heart.
The cardiac revolution.
The cardiac sounds.
The impulse of the heart.
Intra-cardiac pressure.
Physical examination of the heart.
Nervous mechanism.

b. The blood-vessels—
The velocity of the blood.
Cause of circulation.
Blood pressure and tension.
The pulse.
The arterial circulation.
The capillary circulation.
The venous circulation.
Influence of the nervous system.
Peculiarities in the circulation.
Difference between artery and vein.
Transfusion of blood.

APPENDIX K.

BENGAL VETERINARY INSTITUTION.

Syllabus of the "Exterior of the Horse" taught in Class A for the preliminary session ended 31st March 1894.

1. Exterior of the horse—Its object.
2. Centre of Gravity.
3. The Lever and Muscular Mechanism.
4. The inclined plane.
5. Primary divisions of the Horse.
6. Sides of the Horse—off and near.
7. Beauties, Defects, Blemishes and Vices defined.
8. Subdivisions of the Horse. Their situations.

BEZONJI. S. SHROFF, G.B.V.C.,
Lecturer, Bengal Veterinary Institution.

APPENDIX L.

Statement showing the operations performed in the Bengal Veterinary Institution from 10th January to 31st March 1894.

Serial No.	Operations.	Performed on—			Total	Remarks.
		Horses.	Mules.	Cattle.		
1	2	3	4	5	6	7
1	Opening abscesses ...	2	...	...	2	
2	Cauterizing bursati sores ...	1	...	...	1	
3	Canterizing buds of suppurative lymphangyitis.	6	19	...	25	
4	Canterizing cankerous frogs ...	...	1	...	1	
5	Removing cystic tumours ...	2	...	...	2	
6	Removing Filaria Oculi ...	4	...	...	4	
7	Removing fibrous tumours ...	...	...	1	1	
8	Extracting diseased molars ...	...	...	1	1	
9	Setting fractured bones ..	...	...	2	2	
10	Periosteotomy	1	...	...	1	
11	Tapping for synovial distensions ...	1	...	...	1	
12	Castrations	1	...	...	1	
13	Firing Ringbones	1	...	...	1	
14	Firing sprained tendons ...	1	...	...	1	
15	Clamping and firing sand-crack ...	1	...	...	1	
	Total ...	21	20	4	45	

APPENDIX M.

Statement showing the expenditure of the Civil Veterinary Department, Bengal, during the Financial year 1893-94.

DESCRIPTION OF CHARGES.	April.	May.	June.	July.	August.	September.	October.	November.	December.	January.	February.	March.	TOTAL.
1	2	3	4	5	6	7	8	9	10	11	12	13	14
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.	Rs. A. P.
Superintendent's travelling ...	67 6 0	.....	219 6 0	277 12 0	.....	243 2 0	535 0 0	461 8 0	.....	.....	.....	120 0 0	1,924 2 0
Establishment ditto ...	50 1 0	.....	94 3 0	.....	.....	138 2 0	.....	58 12 0	96 12 0	.....	92 5 0	.....	530 3 0
Assistant Superintendent's salary ...	.....	.....	.....	.....	.....	.....	.....	326 10 8	250 0 0	250 0 0	250 0 0	250 0 0	1,326 10 8
Lecturer's ditto	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Establishment ditto ...	60 14 0	69 0 0	69 0 0	69 0 0	69 0 0	69 0 0	69 0 0	69 0 0	69 0 0	69 0 0	208 15 4	235 12 6	1,126 9 10
Students' stipends	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Feed of animals	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	147 7 6	147 7 6
Medicines	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	639 10 7	639 10 7
Veterinary instruments	.....	.....	.....	.....	.....	.....	.....	4,398 13 2	.....	0 6 8	.....	.....	4,399 3 10
Additional plot of land	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1,381 0 0	1,381 0 0
Forge fittings, &c.	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	536 8 6	536 8 6
Photographic camera	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	556 0 0	556 0 0
Filling up a pit	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	500 0 0	500 0 0
New tablet	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	94 8 0	94 8 0
Contingencies	.....	177 1 0	.....	.....	.....	.....	.....	61 1 3	.....	185 1 3	208 13 6	322 1 3	954 2 3
Furniture	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	3,409 0 0	3,409 0 0
Total ...	178 5 0	246 1 0	382 9 0	346 12 0	69 0 0	450 4 0	604 0 0	5,285 13 1	415 12 0	504 7 11	760 1 10	8,192 0 4	17,435 2 2

APPENDIX N.

List of prize-winners at the Sonepur horse show of 1893-94.

Serial number of prizes.	Name of owner.	Residence.		Colour of horse or mare.	Total marks obtained.	Amount of reward.	Remarks.
		Village.	District.				
	CLASS I.—GELDINGS.					Rs. A. P.	
	5 Years and over.						
1	Sanekhi Singh ...	Surna ...	Shahabad ...	Bay ...	100	15 0 0	
2	Lal Bahadur ...	Majhwa ...	Balia ...	Do. ...	78	12 0 0	
3	Ajuha Singh ...	Sitab Diara ...	Do. ...	Chestnut ...	65	10 0 0	
4	Debi Roy ...	Sarna ...	Shahabad ...	Bay ...	63	6 0 0	
5	Ajuha Singh ...	Sitab Diara ...	Balia ...	Grey ...	60	4 0 0	
6	Chaturi Singh ...	Ditto ...	Do. ...	Iron grey ...	58	3 0 0	
							50
	4 Years.						
1	Dalip Roy ...	Sarna ...	Shahabad ...	Dun ...	72	20 0 0	
2	Dulban Naraen ...	Majhwa ...	Balia ...	Do. ...	63	15 0 0	
3	Baldeo Roy ...	Hewatpur ...	Do. ...	Bay ...	60	10 0 0	
4	Angarahit Roy ...	Ditto ...	Do. ...	Iron grey ...	58	8 0 0	
5	Mukhram ...	Majhwa ...	Do. ...	Grey ...	56	7 0 0	
6	Dalip Roy ...	Sarna ...	Shahabad ...	Chestnut ...	56	6 0 0	
7	Baldeo Roy ...	Do. ...	Do. ...	Bay ...	56	4 0 0	
8	Masan Roy ...	Do. ...	Do. ...	Red roan ...	50	2 0 0	
							72
	3 Years.						
1	Ram Parikha ...	Sarna ...	Shahabad ...	Bay ...	66	18 0 0	
2	Satram Misir ...	Bansgopal ...	Balia ...	Do. ...	66	16 0 0	
3	Ram Khelawan Misir ...	Majhwa, Chapra	Do. ...	Roan ...	63	14 0 0	
4	Ghumandi Roy ...	Sarna ...	Arrah ...	Bay ...	62	12 0 0	
5	Jadunath Roy ...	Do. ...	Do. ...	Black ...	62	10 0 0	
6	Lachmi Narain ...	Majhwa ...	Balia ...	Dark bay ...	58	8 0 0	
7	Bisesar Roy ...	Sarna ...	Arrah ...	Iron grey ...	56	7 0 0	
8	Mahadeo Roy ...	Mahnea ...	Balia ...	Bay ...	56	6 0 0	
9	Dawlat Singh ...	Do. ...	Do. ...	Do. ...	53	5 0 0	
10	Badha Roy ...	Sarna ...	Arrah ...	Dark bay ...	51	4 0 0	
							100
	2 Years.						
1	Parmin Roy ...	Sarna ...	Arrah ...	Bay ...	65	12 0 0	
2	Ghamandi Roy ...	Do. ...	Do. ...	Black ...	65	10 0 0	
3	Debi Roy ...	Do. ...	Do. ...	Bay ...	64	7 0 0	
4	Ledri Roy ...	Do. ...	Do. ...	Dark grey ...	58	4 0 0	
5	Shankar Dyal ...	Majhwa ...	Balia ...	Bay ...	52	3 0 0	
6	Sowkhi Roy ...	Sarna ...	Arrah ...	Do. ...	47	2 0 0	
							38
	CLASS II.—MARES.						
	5 Years and Over.						
1	Ram Lal Singh ...	Sarna ...	Arrah ...	Chestnut ...	76	25 0 0	
2	Debi Roy ...	Do. ...	Do. ...	Bay ...	69	20 0 0	
3	Naran Roy ...	Majhwa ...	Balia ...	Grey	68	15 0 0	
4	Gulzar Roy ...	Ditto ...	Do. ...	Dark brown	67	12 0 0	
5	Raghunundon Roy ...	Ditto ...	Do. ...	Bay ...	66	10 0 0	
6	Mahadeo Roy ...	Sarna ...	Arrah ...	Black ...	64	9 0 0	
7	Bishun Roy ...	Pakri ...	Do. ...	Bay ...	63	7 0 0	
8	Sheobalak Roy ...	Sarna ...	Do. ...	Dark brown ...	61	6 0 0	
9	Ram Sarup ...	Majhwa ...	Balia ...	Grey ...	57	4 0 0	
10	Ram Kishun Roy ...	Sarna ...	Arrah ...	Do. ...	55	2 0 0	
							110

APPENDIX N.—*concluded.*

Serial number of prizes.	Name of owner.	Residence. Village.	Residence. District.	Colour of horse or mare.	Total marks obtained.	Amount of rewards. Rs. A. P.	Remarks.
	CLASS II.—MARES—*concld.*						
	4 Years.						
1	Mehandra Roy ...	Setab Deara ...	Arrah ...	Grey ...	76	25 0 0	
2	Jilan Roy ...	Rampur ...	Do. ...	Bay ...	66	20 0 0	
3	Dharam Deo ...	Damodarpur ...	Balia ...	Do. ...	63	15 0 0	
4	Debi Roy ...	Sarna ...	Arrah ...	Red roan ...	62	12 0 0	
5	Suk Dowan Panre ...	Sabalpur ...	Do. ...	Grey ...	60	10 0 0	
6	Raghunath ...	Sarna ...	Do. ...	Iron grey ...	53	9 0 0	
7	Ugagir Roy ...	Do. ...	Do. ...	Black ...	52	7 0 0	
8	Debi Roy ...	Do. ...	Do. ...	Do. ...	51	6 0 0	
9	Faujdar Roy ...	Do. ...	Do. ...	Iron grey ...	46	4 0 0	
10	Ram Charitar ...	Maghrabi ...	Do. ...	Chestnut ...	42	2 0 0	
							110
	3 Years.						
1	Ujagir Roy ...	Sarna ...	Arrah ...	Bay ...	71	20 0 0	
2	Udit Roy ...	Majhowa ...	Balia ...	Do. ...	59	15 0 0	
3	Debi Roy ...	Sarna ...	Arrah ...	Dun ...	57	12 0 0	
4	Baldeo Roy ...	Do. ...	Do. ...	Dark grey ...	48	5 0 0	
5	Ujagir Chunlu ...	Bansgopal, Chapra	Balia ...	Roan ...	54	8 0 0	
							60
	2 Years.						
1	Sital Singh ...	Majhowa ...	Balia ...	Cream ...	...	12 0 0	
2	Mehandra Singh ...	Do. ...	Do. ...	Grey ...	...	10 0 0	
3	Debi Roy ...	Sarna ...	Arrah ...	Bay ...	...	8 0 0	
4	Sarjun Roy ...	Do. ...	Do. ...	Black ...	...	5 0 0	
							35
	Class III.—Yearlings.						
1	Mohabat Roy ...	Pawat ...	Arrah ...	Bay ...	...	5 0 0	5
	Class IV.—Remounts, British, under 3 Years.						
1	Parmeshur Thakur ...	Sheopur ...	Balia ...	Bay ...	...	40 0 0	
2	Bahu Ram Roy ...	Kandesar ...	Arrah ...	Black ...	...	25 0 0	
3	Kunjan Roy ...	Ramdathi ...	Do. ...	Bay ...	...	20 0 0	
4	Parsadi Roy ...	Sarna ...	Do. ...	Do. ...	...	10 0 0	
5	Baldeo Roy ...	Do. ...	Do. ...	Do. ...	...	5 0 0	
							100
	Bengal Cavalry Remounts over 3 Years.						
1	Seo Gobind Roy ...	Behra ...	Arrah ...	Dark bay ...	...	20 0 0	
2	Nihara Roy ...	Do. ...	Do. ...	Bay ...	...	15 0 0	
3	Debi Roy ...	Sarna ...	Arrah ...	Chestnut ...	...	10 0 0	
4	Mahadeo Roy ...	Powat ...	Do. ...	Bay ...	...	8 0 0	
5	Budhram Singh ...	Lahwar ...	Do. ...	Chestnut ...	...	7 0 0	
6	Sakhi Chand Bhagat ...	Dulahpur ..	Do. ...	Bay ...	...	6 0 0	
7	Sowki Roy ...	Sarna ...	Do. ...	Roan ...	...	4 0 0	
8	Baldeo Roy ...	Do. ...	Do. ...	Bay ...	...	20 0 0	
9	Asghar Khan ...	Parrowna ...	Gorakhpur ...	Chestnut ...	...	10 0 0	
10	Ramlagan Roy ...	Sarna ...	Arrah ...	Bay ...	...	5 0 0	105
				Grand Total ...	...	...	785

W. D. GUNN.

H. P. and other—Reg. No. 2302J—500—7-8-94.

REVENUE DEPARTMENT.

AGRICULTURE.

DARJEELING, THE 27TH SEPTEMBER 1894.

ROYAL ASIATIC LIBRARY OF THE BOMBAY BRANCH OF THE

RESOLUTION—No. 567T.—R.

READ—

Letter No. 1030A., dated the 21st August 1894, from the Board of Revenue, Land Revenue Department, submitting the Report of the Agricultural Department for the year 1893-94.

The ninth Annual Report of the Department of Land Records and Agriculture on the subject of agricultural enquiry, agricultural experiments, and agricultural improvements, is, like its predecessors, a record of good intentions and incommensurate results. The report is divided under the following heads, viz., (1) Analysis of districts; (2) Rent and Revenue in precarious tracts; (3) Measures of Protection; (4) Agricultural Improvements; (5) The Bengal Veterinary Department and Cattle-breeding; (6) Notice of Agricultural Statistics; (7) Miscellaneous.

2. Nothing was done during the year under the first two heads. In regard to measures for protection, there was a marked failure in the scheme of emigration to Burma, for the furtherance of which Government continued the subsidy, subject to a maximum of Rs. 1,000 per annum, paid to the British India Steam Navigation Company for the conveyance of State emigrants from Bihar (including Monghyr and Bhagalpur), Chota Nagpur and Orissa at a reduced fare. Only one batch was sent, consisting of 10 men, 8 women, 7 children and 7 infants, against five batches consisting of 191 men, 2 women, 89 children and 33 infants in the previous year. This falling off is attributed to the good harvests of the latter year.

Emigration to Burma.

3. The orders issued to the Settlement Officers of Chittagong, Western Duars and Orissa regarding the establishment of fuel and fodder reserves on Government lands not included in forests reserved under Act VII of 1878, have borne no fruit. It is hardly likely that anything practical will be done in Bengal in this matter. Where fuel and fodder reserves are wanted there is no spare land, and where there is land no such reserves are wanted. The Director will find it hardly necessary to mention this subject at any length in his future reports.

Fuel and fodder reserves.

4. The poverty of results is most conspicuous under the head of silk experiments and eradication of pebrine, on which Mr. Nitya Gopal Mukherji has for years been employed by Government. Mr. Mukherji was appointed with the object of discovering pebrine and other diseases said to be common among silkworms; it was also intended that he should breed kinds of seed which should be free from those diseases, and distribute and sell such seed. The report of Mr. N. G. Mukherji, however, says nothing as to the discovery or prevention of diseases. It appears that 2,134oz. of healthy seed were sold to cultivators, of which 1,650oz. were reared by a private individual and sold by himself. The balance 484oz. were apparently what was reared by Mr. Mukherji, though this is not stated in the report. For an outlay of Rs. 600 the private individual realized Rs. 1,238 for cocoons sold as seed, and Rs. 1,114 for those sold otherwise. But Mr. Mukherji appears to have realized only Rs. 313 for an outlay of Rs. 252 in rearing seed, which excludes the cost of Mr. Mukherji's salary and other incidental expenses, coming to a total of Rs. 7,955 during the year. Something is reported to have been done in the distribution of mulberry plants, but this is hardly a business which requires Government help.

Silk experiments.

5. Experiments were made at the Burdwan farm on paddy, sugarcane, jute, and potato crops with different varieties of manures, but, in the absence of any information as to the cost of manuring in proportion to increased production, the results reported lose their practical value. The planting of sugarcane in deep trenches instead of in irregular shallow furrows appears to have been fairly satisfactory and to have been adopted by cultivators in the neighbourhood of the Burdwan farm. The system of *ratooning* canes, which has been tried successfully for over seven years, appears to be about the only definite result obtained by the Agricultural Department. The record in paragraphs 23-44 of the report, of ignorant and unsuccessful experiments conducted in private estates at the instance of the Department, is rather ludicrous, and at the same time rather lamentable. It is perhaps good for Government officers and zamindars to have taken this interest in the crops and learnt a few rudimentary lessons in cultivation, and enabled themselves to share in the feelings of agriculturists as to the vicissitudes of weather, but it is idle to hope for any serious improvement in the agriculture of the country to be effected in this way.

Experiments with manures.

Crop experiments.

6. The experiment made in Orissa with a small quantity of fine paddy imported from Diamond Harbour is reported to have proved satisfactory. But the actual yield per acre is not stated. Settlement Officers in Orissa report that nothing is accurately known as to the production of rice per acre in that division. They have been directed to make experimental cuttings for the purpose. Instructions have also been issued that strenuous efforts should be made in jail gardens and Wards' and Government estates in order to obtain some knowledge of actual results. No experiments have been ordered to be made in jail gardens as stated by the Director: the instructions of Government were simply that when jail gardens grow cereals for jail consumption, the area sown and produce reaped should be reported to the Agricultural Department.

7. The manufacture of date sugar by the centrifugal machine was fairly successful. Having demonstrated the effects of the machine, the experiment need hardly be repeated.

Manufacture of date sugar by the centrifugal machine.

The Lieutenant-Governor regrets to observe that interest in agricultural reform on the part of leading zamindars is conspicuously absent.

8. The Bengal Veterinary Institution has been put on a proper footing from January in the present year. Rules for the admission of animals into the hospital, and for the admission of students, allotment of stipends, examinations, and award of diplomas were approved by Government, and published in the *Calcutta Gazette* of the 2nd January 1894. The number of students enrolled is 35, of whom 15 are in receipt of a stipend of Rs. 5 per month. The number of animals admitted for treatment since the opening of the hospital on the 10th January 1894 up to the end of the year was 50 horses and mules, 53 bullocks, and 3 dogs. The Report of the Bengal Veterinary Department submitted with the Report of the Agricultural Department has been separately dealt with in detail.

9. The Department published during the course of the year general forecasts of *rabi*, *bhadoi*, the winter rice crops, and of important special crops such as sugarcane, tobacco, mulberry, and poppy. Special forecasts were published of wheat, jute, oilseeds and cotton. Agricultural exhibitions were held at Cossipore, Kushtia, Kalimpong, Falakata, and Alipore, and were assisted with grants of money from Government. Local fairs and shows without the pecuniary assistance of Government were also held at Pabna, Chapra in Nadia, Faridpur, Jalpesh in Jalpaiguri, and Kuch Bihar.

ORDER.—Ordered that the Resolution be published in the *Calcutta Gazette*, and that a copy of it, together with the report and the forwarding letter of the Board of Revenue, be submitted to the Government of India in the Revenue and Agricultural Department, and copy forwarded also to the Board of Revenue, Land Revenue Department.

By order of the Lieutenant-Governor of Bengal,

C. E. BUCKLAND,

Secretary to the Government of Bengal.

No. 568T.—R.

COPY forwarded to the Secretary to the Board of Revenue, Land Revenue Department, for information and guidance.

No. 569T.—R.

COPY forwarded to the Director of the Department of Land Records and Agriculture, Bengal, for information and guidance.

No. 570T.—R.

COPY, with a copy of the Report, forwarded to the Appointment Department of this Government for information.

By order of the Lieutenant-Governor of Bengal,

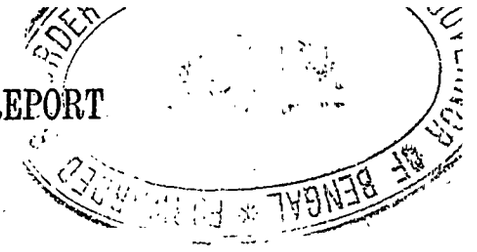
J. G. CUMMING,

Offg. Under-Secy. to the Govt. of Bengal.

DARJEELING,
The 27th September 1894.

R. D'R.—Reg. No. 4693C—520—16-10-94.

ANNUAL AGRICULTURAL REPORT



OF THE

DEPARTMENT OF LAND RECORDS AND AGRICULTURE,

BENGAL,

For the year ending 31st March 1895.

Calcutta:

PRINTED AT THE BENGAL SECRETARIAT PRESS.

1895.

TABLE OF CONTENTS.

	PAGE.
CHAPTER I.—Analysis of districts with reference to security from famine	1
CHAPTER II.—Rent and revenue in precarious tracts	1
CHAPTER III.—Measures of protection:—Emigration to Burma; Arboriculture; Silk experiments and eradication of pebrine; Silk experiments at Alipore; Locusts and other insect pests	1—6
CHAPTER IV.—Agricultural experiments, including farms:—Experimental farms; Experiments in Government, Wards' and private estates; Crop experiments in jail gardens; Crop-cutting experiments in Bengal; Manufacture of date sugar; Agricultural implements; Experiments made by members of the Agri-Horticultural Society of India	6—22
CHAPTER V.—The Bengal Veterinary Department—Cattle-breeding	22—25
CHAPTER VI.—Notice of agricultural statistics	25
CHAPTER VII.—Miscellaneous:—Specification of inventions; Agricultural exhibitions; Supply of seeds, implements and manures; Cost of agricultural experiments; Officers of the Department	26—29

APPENDIX.

	PAGE.
A.—Mr. Nitya Gopal Mukerji's report on silk experiments	i—xiii

INDEX.

	Chapter.	Page.	Para.
Agricultural statistics	VI	25	72
——— exhibitions	VII	26	74
——— experiments and improvements in Wards', Government, and private estates	IV	14—19	23—48
——— implements	IV	20-21	55—60
Agri-Horticultural Society—experiments by members of—	IV	21-22	61
Analysis of districts	I	1	3
Burdwan farm	IV	6-7	15-16
Burma emigration	III	1	5
Cattle-breeding	V	24	67
Cost of agricultural experiments	VII	28	76
Crop experiments in jail gardens	IV	19	49
Crop-cuttings by local officers	IV	19	50
Date-palm	III	2-3	8
Date sugar—manufacture of—	IV	19	52—54
Divi-Divi tree	III	3	10
Dumraon farm	IV	7—10	17—20
Eucalyptus tree	III	3	9
Insects injurious to crops	III	5	14
Locusts	III	5	13
Officers of the department	VII	29	77
Patents—applications for—for inventions	VII	26	73
Pig-breeding	V	25	71
Planting of trees	III	2	6
——— in Hazaribagh	III	2	7
Rent and revenue in precarious tracts	II	1	4
Sibpur farm	IV	10—13	21-22
Silkworm rearing experiments—Mr. Nitya Gopal Mukerji's	III	3	11
——— at Alipur	III	4	12
Supply of seeds, implements, and manures	VII	28	75
Veterinary Department, Bengal	V	22—25	62—70

OFFICE OF THE DIRECTOR OF THE DEPARTMENT OF LAND RECORDS AND AGRICULTURE, BENGAL.

No. 1210 *A.*

FROM W. C. MACPHERSON, ESQ., C.S.,

Director of the Department of Land Records and Agriculture, Bengal,

TO THE SECRETARY TO THE BOARD OF REVENUE, L. P.

Dated Calcutta, the 14th August 1895.

SIR,

I HAVE the honour to submit the Report of this Department on agricultural enquiry, agricultural experiments, and agricultural improvements for the year ending 31st March 1895. This is the tenth Annual Report of this Department of this nature.

2. The report is divided under the following heads:—

Chapter I.—Analysis of districts.
Chapter II.—Rent and revenue in precarious tracts.
Chapter III.—Measures of protection.
Chapter IV.—Agricultural experiments and improvements.
Chapter V.—The Bengal Veterinary Department; Cattle-breeding.
Chapter VI.—Notice of agricultural statistics.
Chapter VII.—Miscellaneous.

CHAPTER I.

ANALYSIS OF DISTRICTS.

3. On account of pressure of statistical work in this office, it was not found possible to begin an analytical report for another district during the year under report. The reports published up to date are the following:—

Mr. Ambica Charan Sen's Reports on Burdwan and Dacca.
Mr. Bhupal Chandra Basu's Report on Lohardaga.
Mr. Nagendra Nath Banerjei's Report on Cuttack.

CHAPTER II.

RENT AND REVENUE IN PRECARIOUS TRACTS.

4. No action was taken by this Department during the year which requires notice under this head. An account of the settlements of rent and revenue under the Director's control is to be found in the Annual Reports of this Department on settlements.

CHAPTER III.

MEASURES OF PROTECTION.

5. *Emigration to Burma.*—The British India Steam Navigation Company continued to convey "State emigrants" to Burma under the conditions mentioned in paragraph 7 of my last Annual Report. The Managing Agents have

favoured me with the following information on the subject of emigration from Bihar to Burma during the year under report:—

"We have to report a fair revival in the emigration from Bihar to Burma, though the tickets have all been issued in one district, viz. Shahabad. The particulars are as follows:—

Steamers.		Date of sailing.	Emigrants.
S.S. *Pentakota*	...	17-4-94	97
„ *Malda*	...	28-4-94	8
„ *Africa*	...	12-5-94	3
„ *Lindula*	...	15-12-94	139
„ *Purnea*	...	16-2-95	57

"The satisfactory point about the past year's working has been that the original settlers have sent home for their families and friends to join them in Burma. The men that have emigrated have been entirely of the agricultural class. We find that Biharis cannot compete successfully with Madrasis in the labour markets of the towns, but they are evidently doing well as settlers.

"The traffic has gone on without the slightest hitch, and the sardars in charge of the different batches have been perfectly satisfied with the arrangements made for the men."

6. *Arboriculture—planting and maintenance of trees in Government and Wards' estates.*—The following information under this head has been obtained from local officers:—

In the Turka Ward's estate in Midnapore Rs. 57-2 was spent in the maintenance of an orchard.

In the Sujamutha Ward's estate 60 mango grafts were planted within the cutcherry compound, out of which 58 are thriving well. Six cocoanut trees were planted, which are all thriving, and 400 cocoanut seeds were sown, of which more than half have germinated. The total expenditure under this head in Sujamutha was Rs. 100.

In the Maldwar Ward's estate in Dinajpur the existing orchards and litchi gardens are reported to have been kept in good order.

In the Sunkerpore Ward's estate in Dinajpur the teakwood plantation, comprising about 1,000 trees in number, is reported to be doing well. The old plantations of mahogany, sisu, mango, and litchi grafts, about 300 in number, are also thriving.

The fruit garden in the Burdhankoti Ward's estate in Rangpur, containing about 500 trees, is reported to be in excellent condition. Rupees 114-9-9 were spent on account of wages of *malis*, &c., entertained to look after the cocoanut plantation at Kajalpatia in the Kujang Ward's estate.

The mango, jack, cocoanut and plantain trees in the orchard at Anantpur in the Kujang Ward's estate in Cuttack are thriving well.

Out of 140 betelnut trees in the plantation at Tikri, 6 died during the year; the rest are in good condition.

Out of Rs. 500 sanctioned by the Board for improvement of the orchard at Ganja in Kanika Ward's estate in Cuttack, Rs. 125-3-9 were expended during the year on account of wages of *malis*, cost of fencing, &c. The Agri-Horticultural Society supplied 14 fruit grafts, which were planted in the orchard during the year.

7. *Planting of fruit trees in Hazaribagh.*—Of the 12 apple trees reported last year to be alive in the Hazaribagh Reformatory compound, the Superintendent reports that 10 are now living, but that they bear small and inferior fruit. A plum tree is thriving. The vines in the Reformatory compound have done very well. This fruit can, the Superintendent says, undoubtedly be cultivated with success in the Hazaribagh district. There were some 200 bunches of grape vines in the middle of May. The fruit trees planted in 1888, viz. pear, peach, and orange trees, have made very little progress.

8. *Date-palms.*—The Deputy Commissioner of Hazaribagh reports that the five Arabian date-palms grown from seedlings received in 1888 from the Saharanpur gardens have grown very little since last year. Their average height is now about 4½ feet, and the average circumference of their stems measured just above ground level is 1 foot and 9 inches. The 225 Tunisian date-palms in Hazaribagh, reported last year to be in fair condition, are now reported to have grown very little, their average height being 4¼ feet, and the average

circumference of their stems just above ground level being now about 17 inches. The Revd. Dr. A. Nottrott, of the German Mission, Ranchi, reports that the Egyptian date-palms planted by him in 1890 in the mission compound at Ranchi are doing well. In Sirguja and Gangpur 11 and 150 Persian and Egyptian date-palms grown from seed supplied to the Chiefs in 1888 are thriving well. In Lohardaga some Persian and Egyptian date-palms grown from seed supplied in 1889 to the Right Revd. the Bishop of Chota Nagpur and to Mr. H. Roy, Barrister-at-Law, are thriving well. Seed of Persian date-palm supplied to Sirguja in 1894 is germinating well; but seed supplied to Bonai did not germinate. The Collector of Shahabad reports that the Egyptian date-palms planted in the Sasaram Subdivisional Officer's compound and in the garden at Nasriganj continue to grow well. The District Engineer of Patna states that the result of cultivation of the Egyptian date-palm in the Patna district goes to show that the soil of the district is not congenial to this palm. The number of Egyptian date-palms in existence in Patna at the end of the year was 63.

9. *Eucalyptus tree.*—The Deputy Commissioner of Hazaribagh reports that the result of the experimental cultivation of the Eucalyptus in the Hazaribagh district is very satisfactory. The trees (over one hundred in number), planted about seven years ago, are thriving well. Some of these blossomed and seeded last year. The seeds were sown about the middle of June last and germinated freely. The young plants are reported to be growing vigorously. The circumference of the trunks of most of the larger trees now measures 3 feet and 2½ feet respectively at 1 foot and 6 feet above ground level.

10. *Divi-Divi trees* (Cœsalpinia coriara).—The Deputy Commissioner of the Sonthal Parganas reports that the *Divi-Divi* trees planted in the compounds of the Jhilimili and Katikund bungalows are growing well. Five of the trees in the Katikund compound have borne seeds during the year.

11. *Mr. Nitya Gopal Mukerji's work in combating silkworm disease.*—Mr. Mukerji's report, which is printed as an Appendix to this report, shows more clearly than he has ever before shown the work which is being done by private individuals engaged in the seed-rearing business who have received advice and assistance from him. Four new "stations" were opened during the year by professional cocoon-rearers with Mr. Mukerji's assistance in the silk-producing districts, viz., two in Malda and two in Birbhum. The results of the seed-rearing were commercially satisfactory, especially in the case of Dandadhar Das, of Kagachira in Malda, who is the largest seed-rearer. On the other hand, the experiments conducted in districts which do not produce silk, viz. at Pakhuria in Manbhum, Kalimpong in Darjeeling, Magura and Babukhali in Jessore, where the work was done, not by professional cocoon-rearers, but by men receiving wages, gave poor results, partly because sufficient supervision could not be given to them, and partly because it was not found possible to dispose of the seed produced.

Mr. Mukerji shows that at the 11 "stations" at which seed-rearing was carried on during the year with his advice and assistance, 798½ kahuns, or 2,388 ounces, of healthy seed were sold during the year as against 1,035, 1,900, and 2,134 ounces sold in the three previous years. The seed was bought chiefly by cocoon-rearers in Malda and Birbhum. The seed-rearing work done at Berhampore was on a small scale, only for experimental purposes.

Mr. Mukerji claims to have obtained two important results in the year's work, viz.—(1) in invention of a trap for killing the parasitic fly which attacks the silkworm, and (2) in application of carbon bisulphide for killing the chrysalis in the cocoon.

During the year Mr. Mukerji gave much time to preparation of a hand-book of sericulture in the Bengali language and to translation of the hand-book into English. The book gives detailed instructions with regard to cultivation of the mulberry, rearing of silkworms, diseases of silkworms and their treatment, manufacture of silk, and the silk trade. Mr. Mukerji has published the hand-book in Bengali at his own expense as a private enterprise. At my request he has translated it into English. The English translation has been submitted to Government.

The total expenditure incurred by Government on the sericultural experiments conducted by Mr. Mukerji during the year 1894-95 was Rs. 8,259 against Rs. 7,955 expended in the preceding year.

In paragraph 21 of his report Mr. Mukerji complains that he was unable to buy seed raised at the Kalimpong station in the years 1893-94 and 1894-95 for resale to cultivators in the silk-producing districts for these years, because the details of his estimates were not sanctioned until the end of the year. I find, however, that in his detailed estimate for the year 1893-94, submitted with his letter No. 312, dated 24th March 1893, Mr. Mukerji made no provision for purchase of seed, and that he stated in that letter that it was unnecessary to make such provision. In a revised estimate dated 7th June 1893, he provided Rs. 300 for "cost of raising seed," and he spent Rs. 252 under this head during the year. In the estimate for 1894-95, submitted with Mr. Mukerji's letter No. 138, dated 18th October 1893, no provision was made for purchase of seed. In a revised estimate dated 4th May 1894, Mr. Mukerji provided Rs. 2,000 for purchase of seed. He in fact spent Rs. 244 during the year 1894-95 in purchase of seed. The details of Mr. Mukerji's expenditure were under discussion throughout both years, because his estimates did not satisfy higher authority. I cannot find that Mr. Mukerji made any application during either year for permission to purchase seed reared at Kalimpong.

12. *Silkworm rearing experiments at Alipore.*—The silkworm rearing experiments which have been carried on at Alipore, near Calcutta, by the Silk Committee since 1891, and which were noticed on page 4 of this Department's report for the year 1893-94, were continued during the year under report and were closed in April 1895. The Silk Committee have succeeded in raising healthy seed at Alipore and getting rid of disease, mainly, it would appear, through constant feeding on mature leaves and with the help of air and cleanliness; also by the help of the microscope. The system of silkworm rearing at Alipore is described as follows by Mr. G. C. Hodgson, Secretary to the Silk Committee:—

1. *Food.*—The mulberry plants are allowed to grow until 6 to 8 feet high and cut down at intervals, so as to ensure a constant supply of mature leaf.
2. The worms are fed only with mature leaf from the day that they emerge from the egg.
3. They are given a constant supply of food beginning with 18 times a day at first and gradually reducing as they increase in size, but never less than 8 times daily when the worms are feeding freely.
4. A limited amount of leaf is given at each meal, so as not to accumulate heavy beds of refuse leaf.
5. *Cleanliness.*—Use of nets to enable the worms to be moved and beds cleaned.
6. Paper on the feeding traps to be changed when dirty (when working for seed).
7. Fumigation with sulphur at each moult.
8. Rearing and spinning trays to be disinfected with sulphate of copper after each rearing.
9. Rearing-house to be whitewashed and floor cleaned with sulphate of copper after each rearing.
10. Ample ventilation without draughts by means of perforated zinc doors and windows. The latter should reach to the floors, as the gas given off by the worms is heavier than the air.
11. *Seed.*—Selection by picking out the finest cocoons, both as regards shape, colour, and strength endways, and rejecting as unfit for seed all eggs of which the producers both male and female are not microscopically free from all signs of disease. Also, if the moths' discharge is dark in colour, or if they stain the cocoon brown in their exit, or if they lay irregularly, they are rejected when working for seed.
12. Great care is necessary in spacing the worms from the day of their birth. This most important point is usually ignored until the worms are large, while it is infinitely more important in the earlier stages.

The Committee having been satisfied that they were rearing healthier worms at Alipore than were produced in the silk districts, sold and distributed seed in the silk districts. As, however, native rearers will neither feed nor treat their worms in the methods practised at Alipore, it was decided by the Silk Committee to raise seed in a silk district on their own methods. An experiment was accordingly made in July 1894 at Tarakpur in the Murshidabad district by a servant of the Silk Committee on the methods followed at Alipore, with the result that a most successful crop of cocoons was raised.

The Silk Committee have stated that having proved that pure healthy seed can be raised in the silk districts by the system adopted at Alipore, they consider it unnecessary to continue their experiments, and they have therefore discontinued the experiments from April 1895. A report drawn up by the Committee on the result of their experiments since 1891 has been submitted to Government with my letter No. 1120A., dated 24th July 1895.

A grant of Rs. 500 was made from the funds of this Department during the year in aid of the sericultural experiments at Alipore. The total expenditure incurred on the Alipore experiments from the beginning has been approximately Rs. 10,000, out of which sum Rs. 2,400 were contributed by Rao Jogendra Narayan Ray, of Lalgola, and Rs. 1,750 by the Bengal Government. The balance of the expenditure was met from funds provided by Messrs. Anderson, Wright & Co., the Bengal Silk Company, Limited, Messrs. George Henderson & Co., Messrs. Hodgson and Taylor, Messrs. Lyall, Marshall & Co., Messrs. L. Payen & Co., Messrs. Robert, Watson & Co., Limited, Babu Lall Behary Dutt, M. Ferguson, Esq., and Rao Jogendra Narayan Ray.

13. *Locusts* did not appear or were not noticed during the year in the districts of these Provinces, except in Tangail subdivision in Mymensingh, where they did no appreciable injury, and in Koderma thana in Hazaribagh district, where they did some slight injury to the rice crop.

14. *Other insects injurious to crops.*—The district reports give the following information with regard to damage done by insects:—In the Ballia outpost in the Begusarai subdivision of the district of Monghyr, injury was reported to the crops from an insect called "*ragra.*" The insect is said to be of a greenish-black colour and is about an inch in length. It destroyed the plants by cutting them near the roots. The damage done was not general or widespread. In Pakour subdivision in the Sonthal Parganas, an insect known as "*bhalapaku*" did slight injury to crops.

In the Alipore Duars insects did harm to cauliflowers, beetroots, and cabbages. Mr. Basu, Assistant Director, was of opinion that the use of dung manure favoured the generation of these insects, and suggested the use of bone manure.

In the Mynaguri tahsil farm Naini Tal potatoes suffered from a fungoid disease.

Mr. N. G. Mukerji, Deputy Collector on special duty, reports that the following kinds of insects injurious to crops were observed by him during the year:—"The first is a bean-leaf parasite. It was found almost in every bean-creeper (*Dolichos Bengalensis*) at Berhampore last September. Some of the creepers were treated with a mixture of one part of kerosine oil, one part of sour milk, and 100 parts of water, which had the effect of killing the larvæ and restoring the vigorous growth of the creepers.

"The second is a cucumber-fly found also at Berhampore on the surface of leaves and fruits of cucumber vines last September (identified by the Superintendent of the Indian Museum as the chrysomelid beetle *Aulacophora abdominalis*). Spraying with kerosine mixture described above killed these also.

"The third is a brinjal-stalk parasite, or probably two different species of parasites, one found inside the stalks, and the other on the surface of stalks and leaves (viz. the beetles, and the more slender larvæ). The larvæ and the beetle appeared in the brinjal field of the Berhampore public garden last July (identified by the Superintendent of the Indian Museum as a *coccinellia* beetle *Epilachna sp.* and a cetonine beetle *Glycyphana versicolor, Fabr.*). The plants were dusted over with a mixture of one ounce of London purple, one ounce of quick-lime, and three pounds of cowdung ashes, powdered up fine and put in little calico bags. This proved an effective remedy, and the brinjal plants, nearly denuded of their leaves, put forth new shoots afterwards and produced almost the normal quantity of fruits.

"The fourth is a black beetle (identified by the Superintendent of the Indian Museum as the chrysomelid beetle—*chrysomela vishnu*) found to eat up the chrysalids of wild mulberry cocoons (*Theophilla Huttoni*). These beetles were found last May almost in every mulberry cocoon found in the Kalimpong nursery. These were very much larger than the Dermestes Lardarius beetles which spoil the domesticated cocoons both in India and in Europe.

"The fifth is the kuji fly of Malda, a tachinid parasite found only in May and June in Malda. They are parasitic to the mulberry silkworm in the same way as the *Trycolyga Bombycis*, from which they differ both in appearance and in their manner of attacking silkworms. The kuji fly is smaller than the ordinary silkworms fly, and it has an arched back (kuji meaning

hunch-backed). They also differ in their behaviour from the ordinary silkworm fly, as they make a silent and a direct dash at the silkworm trays, instead of buzzing about in the vicinity of rearing houses and moving about openly among silkworms and depositing eggs upon them, as the *trycolyga* do."

Mr. Mukerji described his methods of keeping off and destroying the silkworm parasite flies in his book on sericulture published in Bengali during the year.

The Commissioner of the Dacca Division reports that in the district of Dacca insects appeared in some parts of the Narainganj subdivision and injured the mustard crop only.

CHAPTER IV.

AGRICULTURAL EXPERIMENTS AND IMPROVEMENTS.

Burdwan Farm.

15. The operations at the Burdwan farm during the year 1894-95 comprised experiments with manures and implements, in the conservation of cattle dung, in *ratooning* and trench planting for sugarcane, and in ascertaining the relative outturn of different kinds of paddy and different kinds of sugarcane.

(1) *Manures.*—The manure experiments were made with paddy, jute, sugarcane and Naini Tal potatoes. Cowdung, castor-cake, bonemeal, and a mixture of bonemeal and saltpetre were applied to the paddy crop. The results of the experiment pointed, as in previous years, to the value of an admixture of bonemeal and saltpetre, which enhanced the yield from 17 maunds 29 seers of paddy and 22 maunds 13 seers of straw per acre—the average outturn of three unmanured plots—to 56 maunds 32 seers of paddy and 77½ maunds of straw per acre, and gave a net increase in profit estimated at Rs. 95 per acre.

The results obtained with jute last year were in accord with those obtained in previous years, the experiment showing that cowdung is a better manure for this crop than castor-cake, bonemeal, or super and saltpetre. The outturn of fibre in the cowdung plot amounted to 20 maunds 35 seers per acre, and the net profit, after deduction of all cost of cultivation and manuring, was Rs. 45 per acre. The quality and length of the fibre was exceptionally good, and the price obtained for it was accordingly 8 annas more per maund than the fibres usually sold in the local market. The seed used in the experiment was obtained from Serajganj. A small quantity of seed was distributed to raiyats who were satisfied with it.

On Dr. Leather's recommendation, the manurial experiment with sugarcane during the year under report was designed to ascertain the relative merits of single manures instead of mixtures of manures. The largest amount of *gur* was obtained by the application of bonemeal. Next in point of outturn came that obtained from superphosphate, and then followed castor-cake and cowdung. Saltpetre yielded only half the amount of *gur* obtained from the other plots, while the unmanured plot failed to give any outturn whatever.

The experiment with potatoes was designed to test the comparative merits of cowdung, castor-cake, and bonemeal. The outturn of the plots treated with these manures, and of the unmanured plot with which they were contrasted, amounted to 231 maunds, 186 maunds, 133 maunds, and 72 maunds per acre, respectively, and the net profits, after deduction of cost of manures and of cultivation, are estimated at Rs. 375, Rs. 221, Rs. 164, and Rs. 62, respectively, per acre. The Naini Tal variety of potatoes was used in this experiment.

(2) *Conservation of dung.*—Under Dr. Leather's advice, arrangements were made during the year to conserve cattle manure in pits. Observations are being recorded with regard to the yield and value of the manure.

(3) *Implements.*—The operation under this head consisted of the test of the Sibpur wrought-iron plough against the ordinary country plough. It was found that the plot deep ploughed with the Sibpur plough gave an increase in outturn of 1 maund 29 seers of paddy and 4 maunds 28 seers of straw per acre, and in the net profit of Rs. 4-3 per acre. The result was confirmatory of the experience of the previous year.

(4) *Methods of cultivation.*—The experiments under this head were directed (*a*) to test the effects of *ratooning*, and (*b*) to compare the method of planting in trenches with that of the local method of planting in irregular shallow furrows. Both these methods of cultivation have now been adopted by neighbouring raiyats. The *ratooning* experiment, which was commenced in the year 1887, was closed during the year under report. The outturn of each year is shown below :—

Year.	Outturn of *gur* per acre. Mds. s. ch.
1887-88	... 69 24 0
1888-89	... 86 16 0
1889-90	... 95 8 8
1890-91	... 125 4 0
1891-92	... 98 4 0
1892-93	... 95 28 0
1893-94	... 40 20 0
1894-95	... 17 10 0

The experiment points to the value of *ratooning* canes for a period not exceeding five years. It will be seen that the outturn increased annually up to the third year of *ratooning*, and that it was quite satisfactory up to the fifth year of *ratooning*. In the sixth year the outturn fell off by half, while in the seventh year the outturn was only nominal. It is to be observed that this experiment has succeeded in the farm with the *khari* variety, which is a thick-skinned cane. Experiments in *ratooning* the thinner-skinned and more delicate *samshara* (local) variety have failed to give good results.

Trench planting for sugarcane was found, as in previous years, to be superior to the local method of planting in shallow furrows, showing an increase in the outturn of *gur* of 22 maunds 12 seers per acre, and in the net profit, after deducting all costs of cultivation, of Rs. 109 per acre.

(5) *Varieties of crops.*—Two experiments were conducted under this head in order to compare the relative merits in point of productiveness of different varieties of paddy and of sugarcane. It was found that it is more profitable to cultivate the fine variety of paddy obtained from Diamond Harbour, although it yields a smaller outturn than the local coarse variety. The result of the variety experiment with sugarcane was corroborative of the experience of the previous year, viz., that the Cawnpore cane yields a larger outturn than the *khari* cane.

16. *Expenditure and receipts of the Burdwan Farm.*—The gross expenditure in 1894-95 amounted to Rs. 2,172-3-3 against Rs. 2,087-14 incurred in the previous year, the increase of expenditure being due to an extension of the area of the farm at a cost of Rs. 208-3-9. The actual expenses of cultivation during the year, exclusive of the Overseer's pay, amounted to Rs. 1,511-10-6, and the receipts, comprising price of produce sold and valuation of produce in hand, amounted to Rs. 1,145-1-9. The work of bringing to the notice of the neighbouring raiyats the methods of cultivation followed on the farm was much developed last year, and is briefly described on page 14 of this report.

The Dumraon Farm.

17. The experiments undertaken at the Dumraon Farm last year were a repetition of those made in the previous year. They may be grouped under the following heads :—(1) Experiments with manures; (2) Experiments in deep *versus* shallow cultivation for paddy, *khesari*, and wheat; (3) Experiments with new crops and new varieties of existing crops; and (4) Trials of new agricultural appliances. A brief description of each experiment is given below :—

(*i*) *Experiments with manures.*—These were intended to ascertain the value (1) of bone manure for winter paddy and *khesari;* (2) of bone manure with and without the addition of crude saltpetre for wheat; and (3) of crude saltpetre alone for wheat.

The experiment first named was made in three equal plots of land, three of which were manured with bonemeal at the rate of six maunds per acre, and the remaining three received no manure. The land first bore a crop of winter paddy, and then a crop of *khesari* in the *rabi* season. In the case of neither crop did the bone manure show good result; in fact, a decidedly smaller

outturn both of paddy and *khesari* was obtained from the three plots manured with bonemeal than from the three unmanured plots. This result fully supports the result from the same experiment in the previous year. It also lends support to the theory that on heavy clay soils, specially those already rich in lime, such as the soil of the Dumraon farm is, the use of bonemeal may do injury instead of good.

The second manurial experiment was designed to test the effects of bonemeal with and without the addition of saltpetre for wheat. For this experiment five equal plots of land were taken, two of which were manured with bonemeal at the rate of six maunds per acre, two with bonemeal at the above rate and with saltpetre at three maunds per acre, and the fifth plot was left without any manure. The season proved to be unfavourable in many respects to the wheat crop last year, and the outturn of grain and straw was very poor in consequence. Yet comparing the outturns of the plots *inter se*, it appeared that as in the similar experiment with paddy and *khesari*, the outturn of the two plots manured with bonemeal alone (4 maunds 30 seers of grain per acre) was slightly less than that of the two unmanured plots (4 maunds 35 seers of grain per acre). The two plots manured with bonemeal and saltpetre gave, however, the highest outturn (6 maunds 19 seers per acre), due, no doubt, to the action of the nitre alone.

The action of saltpetre or nitre on wheat was more clearly borne out by the third manurial experiment noted above. It was made in four plots of land, two of which were top dressed with crude saltpetre at the rate of three maunds per acre, and the other two left without manure. The average outturn per acre of the two manured plots was 7 maunds 9 seers of grain and 13 maunds 20 seers of straw against 4 maunds 33 seers of grain and 8 maunds 20 seers of straw from the unmanured plots. The increase in the yield obtained by the use of saltpetre failed, however, to cover the price of the manure.

(*ii*) *Experiments in deep* versus *shallow cultivation.*—There were two experiments under this head—(1) with winter paddy and *khesari*, and (2) with wheat. In both these experiments the deep cultivation was effected by means of two Sibpur soil-inverting iron ploughs, one following immediately in the furrow made by the other. The plots under shallow cultivation were ploughed with the country plough in the usual way.

The experiment with paddy and *khesari* was made in 12 plots of land, 6 of which were cultivated deep and the other 6 shallow. The depths of cultivation were 5 and 3 inches respectively. All these 12 plots bore a crop of winter paddy. In the *rabi* season, three out of the six plots under deep cultivation, and the same number of plots under shallow cultivation, were cropped with *khesari*, in order to test whether the deep cultivation given to the preceding paddy crop exercised any beneficial effect on the succeeding crop of *khesari*. The average outturns per acre of paddy and *khesari*, together with the cost of cultivation and value of outturns, are exhibited below:—

	Outturn per acre.				Cost of cultivation.			Value of outturn.		
	Grain.		Straw.		Rs.	A.	P.	Rs.	A.	P.
Deep ploughed plots.	Mds.	seers.	Mds.	seers.						
Paddy ...	16	33	28	7	31	0	1	37	1	1½
Khesari ...	21	19	23	35	10	0	10	33	10	2
Total ...	38	12	52	2	41	0	11	70	11	3½
Shallow ploughed plots.										
Paddy ...	15	15	27	25	29	7	10	34	14	2
Khesari ...	19	2	23	18	10	0	10	30	2	3
Total ...	34	17	51	3	39	8	8	65	0	5

It will be seen from the figures given above that deeper ploughing to the depth of 5 inches produced a larger yield of grain and straw both with

paddy and *khesari* than the comparatively shallow ploughing to the depth of 3 inches. In case of deeper ploughing the net profit was Rs. 4-2-7½ per acre in excess of that obtained from shallow ploughing. The above results fully confirm the experience previously gained at the farm.

The experiment to test deep against shallow cultivation for wheat was made in four equal plots of land, two of which were ploughed deep and two shallow in the same way as in the experiment with paddy and *khesari* related above. It has been stated before that the season proved unfavourable to wheat, and in consequence the yield was comparatively poor. The outturns per acre were 6 maunds 37 seers of grain and 12 maunds 22 seers of straw from the deep-ploughed plots against 6 maunds 3 seers of grain and 11 maunds 10 seers of straw from the plots shallow ploughed, thus leaving a difference of 34 seers of grain and 2 maunds 12 seers of straw per acre in favour of deep ploughing.

(*iii*) *Experiments with new crops and new varieties of existing crops.*—The new crops and varieties tried during the year were (1) Muzaffarnagar wheat and (2) *aus* paddy. Muzaffarnagar wheat was tried on the farm against two local varieties, namely, (1) the white, popularly known as Buxar white or club No. 1, and (2) the red. Muzaffarnagar wheat is a soft, white variety, well known in the market, and having a reputation equal to Buxar white. It had been tried against the local white and red varieties in previous years, and found to give a larger outturn than the two latter, although after cultivation for two or three years, it showed evident marks of deterioration both as regards quality and productive power. This defect, however, could be easily remedied by periodical importation of new seed. The experiment made last year was meant to test anew the adaptability of Muzaffarnagar wheat to the soil and climate of Shahabad. The result was distinctly in its favour, as will appear from the figures of outturn given below:—

		Outturn per acre.			
		Grain.		Straw.	
		Mds.	seers.	Mds.	seers.
Muzaffarnagar	...	8	25	15	24
Buxar, white	...	7	37	14	15
Local red	...	7	32	13	30

The experiment in the cultivation of *aus* paddy was initiated in 1893-94 at the request of Mr. F. H. B. Skrine, the Collector of Shahabad. It was meant to ascertain whether *aus* paddy, a dry land crop, could be profitably cultivated in Bihar. In that year it was grown on two plots of land, but the outturn was exceedingly poor, being 2 maunds 35 seers per acre in one plot and 2 maunds 17 seers in the other. During the year under report, the crop was also raised in two plots, one sown with seed saved from the previous year's produce, and the other with seed newly obtained from the Hooghly district. The outturn, though not satisfactory, was considerably in excess of that obtained in 1893-94, being 8 maunds 34 seers per acre from the plot sown with newly-imported seed and 10 maunds 29 seers per acre from the plot sown with home-saved seed.

(*iv*) *Trials of new agricultural appliances.*—The appliances tried during the year were (1) an iron thresher newly invented by Messrs. Thomson and Mylne, of Behea, and (2) the Crosskill clod-crusher. The iron thresher was compared with the country system of threshing in two experiments, one with winter paddy and the other with wheat. In threshing paddy the iron thresher took a much longer time than the country method, and failed to thresh out all the corn. With wheat it was more successful. It threshed out a larger quantity of corn from a given quantity of plants than the country system of threshing. On the other hand, the chaff made by the iron thresher lacked in softness, and was consequently of a coarser quality than chaff made by the bullock's feet. The Crosskill clod crusher was tried during the year under report, and, as in the previous year, it was found very useful in reducing the hard clods which invariably form on the heavy clay soil of the farm.

18. *Conservation of cowdung.*—Much attention was devoted to this during the year under report. A series of experiments has been instituted at Dr. Leather's

suggestion to ascertain the quantity of manure produced by a given number of cattle in a year.

The experiments were conducted at the Dumraon farm with 14 bullocks kept in a shed for 17 hours every day. The first part of the experiments lasted for 120 days, during which time the bullocks received the following food:—

		Mds. srs. ch.
Straw ...	...	274 15 2
Oil-cakes ...	...	20 33 0
Salt ...	...	0 17 4
Total	...	295 25 6

Deducting from this the quantity rejected by the bullocks, *e.g.*, 12 maunds 5 seers 4 chitaks, as found by weekly weighment, the food actually consumed amounted to 283 maunds 20 seers 2 chitaks.

The dung voided by the bullocks was weighed every week, and then stored in a pit. By the end of the experimental period 608 maunds 23 seers 4 chitaks, or 49,903 lbs. 10½ oz., of dung had been put into the pit. Six months afterwards the dung was taken out and again weighed, when it was found to be 34,527 lbs. 8 oz., showing a loss of 15,376 lbs. 2½ oz. by evaporation and fermentation.

The dung was used for the sugarcane crop at the old experimental farm at Dumraon, and a sample was sent to Dr. Leather for examination.

19. It was stated in my report for the last year (page 8) that Dr. Leather, Agricultural Chemist to the Government of India, had made certain suggestions with regard to the future conduct of the Dumraon farm. One of these was to abandon the present site of the experimental farms, which he considered to be unsuitable for experimental purposes. Dr. Leather visited the farm twice during the last year—once in August 1894 and a second time in January 1895. A piece of land near the railway station, measuring about 31 acres, was then selected as the new site for the experimental farm. It is intended gradually to transfer the experiments to the new land and to abandon the old site after a year or two. A part of the new land was enclosed with a wire fence during the year under report. The experimental cultivation on the new land will commence in the current year.

20. The gross expenditure of the Dumraon farm, including the maintenance of the Economic Museum, amounted to Rs. 2,628-4-3 against Rs. 1,721-5-1 in the previous year. The excess of expenditure was due to the cultivation and fencing of the land newly taken. The receipts of the farm amounted to Rs. 677-3-2 against Rs. 400-13-8 in the previous year.

The Sibpur Farm.

21. The work done on the Sibpur farm during the year 1894-95 may be divided under the following heads:—(1) Experiments with manures; (2) conservation of cowdung; (3) trial of new and improved implements; (4) experiments in new method of cultivation; (5) experiments with new crops and new varieties of existing crops. The results obtained under each of these heads are briefly described below:—

(1) *Experiments with manures.*—Two manure experiments were made—one to test the value of green manuring and castor-cake for potatoes, and the other to test the value of crude saltpetre and castor-cake for cabbage.

The experiment first named was started in the year under report, and will be continued for a number of years. A piece of land was specially prepared for the experiment by levelling and cropping it for two years without any manure, care being taken to make it of uniform quality throughout. It was divided into eight equal plots of $\frac{1}{10}$th acre each, three of which were green manured with *dhanche* (sesbania aculeata), three manured with castor-cake at the rate of 18 maunds per acre, and two were manured both with green *dhanche* and castor-cake at the rate abovementioned. In the plots green-manured the *dhanche* crop was cut in a green state in the second week of August and then ploughed in.

The average outturn of potatoes per acre in each case, together with its price and the cost of cultivation, was as follows:—

	Outturn per acre.		Cost of cultivation per acre.			Value of outturn per acre.		
	Mds.	seers.	Rs.	A.	P.	Rs.	A.	P.
Green manure and castor-cake ...	112	11	177	0	2	210	9	1
Green manure alone	91	30	142	0	2	172	15	6
Castor-cake alone	97	5	180	2	2	181	14	8

Green manuring with *dhanche* gave a smaller outturn than an application of castor-cake at the rate of 18 maunds per acre; but from a financial point of view it proved to be more profitable than the other. Again, by adding castor-cake to the green manure, a larger yield as well as larger profit was obtained, than from the use of either of the manures applied singly. The experiment is, however, one which requires to be repeated for several years before any conclusion can be safely drawn.

The experiment with cabbage was initiated in the year 1892-93. The results obtained this year tend to show that a dressing of crude saltpetre at the rate of 12 maunds per acre was of the same value from a financial point of view as an application of castor-cake at the rate of 9 manuds per acre. During the year under report two plots, each $\frac{1}{6}$th acre in area, were brought under experiment. Each of these plots was divided into two equal portions, one of which was manured with crude saltpetre at the rate of 12 maunds per acre costing Rs. 43-8, and the other with castor-cake at the rate of 30 maunds per acre costing Rs. 61-14, thus leaving a difference in outlay of Rs. 18-6 per acre in favour of saltpetre. The average outturn per acre obtained was 333 maunds of cabbage from the two plots manured with saltpetre, valued at Rs. 157-5, and 357 maunds of cabbage from the two castor-cake plots, valued at Rs. 174-12, thus showing a difference in money value of outturn of Rs. 17-7 per acre in favour of castor-cake.

The usefulness of crude saltpetre as a manure for cabbage had been also demonstrated by experiments in the years 1892-93 and 1893-94. Several raiyats cultivating in the neighbourhood of the farm were induced last year to use this manure for cabbage and other English vegetable crops, and expressed themselves well pleased with the result. They will probably again use it this year.

(2) *Conservation of cattle-dung.*—Since 1892-93 attention has been devoted in the farm to the proper conservation of cattle manure. An experiment was undertaken last year to ascertain the quantity and quality of manure produced by a given number of bullocks in a year. For this purpose the food given to the farm bullocks, as well as the dung and urine voided by them during the time that they were kept in stall or shade, *i.e.*, for about 12 hours every day, were daily weighed for a period of six months from the 1st May to the 31st October 1894. The dung after weighment was deposited in a masonry pit, and once in a week the contents of the pit were pressed down with the feet in order to prevent the loss of moisture as far as possible. It was found that from the five head of bullocks were got in six months about 115 maunds of dung and 27 maunds of urine. This, with 17 maunds of refuse fodder, in all 159 maunds, was deposited in the pit. About six months after the close of the experiment the contents of the pit were again weighed, and it was found that the 159 maunds of dung, urine, and refuse fodder had been reduced to about 71 maunds by loss of moisture and decomposition. From the figures given above it would appear that a well-fed bullock would produce in a year about 46 maunds of dung weighed in a raw state and 11 maunds of urine. These, together with the remains of the fodder, would yield about $28\frac{1}{2}$ maunds of ripe manure after having been allowed to lie over for nearly six months.

(3) *Use of new and improved implements.*—Besides the Sibpur plough, which is in constant use on the farm, the only new implement tried last year was the "Planet Jr." American hoe. It was found very useful in lightly stirring up and clearing weeds in the spaces left between rows of such crops as Reana and Guinea grass.

(4) *Experiments in new methods of cultivation.*—These were (1) to compare deep with shallow cultivation for jute, barley and maize; (2) to compare the

method of planting potatoes in double rows, which prevails in North Bengal, with the method of planting them in single rows, which obtains in Central Bengal and Bihar; and (3) to ascertain the capability of the *khari* variety of sugarcane for purposes of *ratooning*.

The jute and maize crops in the experiments with deep *versus* shallow cultivation failed through want of rain, and perhaps through defective tillage. The crop of barley which followed jute in the plots under deep and shallow cultivation also gave a very poor outturn, owing, it is believed, to the entire absence of rain during the last cold weather.

The experiment in the method of planting potatoes in double and single rows was opened in the previous years. It was made in duplicate in four plots about $\frac{1}{10}$th acre each, two of which were planted in double rows, the sets being placed in two parallel lines 6 inches apart, the distance between the furrows being 3 feet; the other two plots were planted in single rows as usual, the distance between the furrows being 2 feet. The former naturally required one-third more seed potatoes than the latter. The average outturn per acre, together with the cost of cultivation and value of outturn, is shown below :—

	Average outturn of potatoes per acre.	Cost of cultivation per acre.	Value of outturn per acre.
	Mds. sr. ch.	Rs. A. P.	Rs. A. P.
Double rows ...	154 17 0	259 7 3	289 7 8
Single rows ...	121 5 0	200 11 1	240 12 2

It will be seen that although planting in double rows increased the yield by nearly 33 maunds per acre, due, it seems, to the use of a larger quantity of seed, it was less profitable from a financial point of view than the method of planting in single lines.

The experiment in ratooning the *khari* variety of sugarcane was in continuation of the experiment begun four years ago. A small plot of land, measuring $2\frac{1}{2}$ cottahs ($\frac{1}{24}$ acre), was planted with *khari* sugarcane in the year 1891-92. The fourth crop after planting was reaped last year, yielding an outturn of jaggery amounting to 57 maunds 25 seers per acre, and a profit of Rs. 102-14-7 per acre after deducting all costs of cultivation. The yields of jaggery in the successive years have been as follows :—

Year.	Outturn per acre.
	Mds. sr. ch.
1891-92	... 50 26 8
1892-93	... 70 32 0
1893-94	... 55 17 0
1894-95	... 57 25 0

Fresh shoots have again come up from the stools of the fourth crop, and promise to yield a good outturn this year. It remains to be seen for how long the crop can be kept on. The results above stated fully bear out the experience gained in the Burdwan farm from a similar experiment with the *khari* variety of sugarcane.

To put the ratooning qualities of *khari* cane to a more thorough test, a large area on the farm, $2\frac{3}{8}$ bighas, has been planted with this crop during the last two years. A portion of it now bears the third crop, and the remainder the second crop after planting. Last year a satisfactory outturn, amounting to nearly $52\frac{1}{2}$ maunds per acre, was obtained from a part of this area, and the crop on 10 cottahs was sold standing for seed purposes to an agriculturist for Rs. 50, thus fetching an income of Rs. 300 per acre.

It may be noted here that although the *khari* variety of sugarcane is far better adapted for ratooning, grows more freely, and resists drought and insect pests far better than any other variety known in Lower Bengal, it suffers from two disadvantages which ought not to be lost sight of: *first*, that the jaggery from *khari* sugarcane has a slightly saline taste, and is not so well suited for the manufacture of refined sugar as jaggery from the *samsara* variety, which is preferred to all others for that purpose; and, *secondly*, by ratooning, the canes gradually get harder every year, thus rendering the task of crushing the canes more difficult and expensive.

(5) *Experiments with new crops and new varieties of existing crops.*—The new crops and varieties tried were oats, several kinds of fodder grasses, and same varieties of tobacco new to Bengal.

Oats.—Oats have been successfully grown at the Sibpur farm since 1889-90. Last year this crop was cultivated on a large area (12 bighas 3 cottahs); no manure was applied, and the crop suffered somewhat from want of rain during the last cold weather. Previous to 1894-95 the crop was grown as a grain crop, but last year the larger portion of the area (10 bighas 3 cottahs) under oats was cut in a green state for hay, and the remainder, 2 bighas, reaped for grain and straw. The outturn of hay from the area cut green was at the rate of 42 maunds per acre, valued at Re. 1-8 per maund, and brought in a net profit of Rs. 34-15-8 per acre. The outturn of the area reaped when ripe was at the rate of 11 maunds 34 seers of grain and 13 maunds 13 seers of straw per acre. Considering the character of the season, the yield was fairly satisfactory, although it resulted in a net loss of Rs. 4-15-10½ per acre. The average outturn of oats in the Sibpur farm during the past four years has been as follows:—

	Outturn of oats per acre.	
	Mds.	sr.
1891-92	19	33
1892-93	20	20
1893-94	9	39
1894-95	11	34

The hay produced on the farm last year was of an excellent quality, and the bulk of it was purchased at Re. 1-8 per maund for the Veterinary Hospital at Belgatchia.

Fodder grasses.—The fodder grasses cultivated last year were sorghum, reana, and Guinea grass. Sorghum and reana have been grown for many years on the farm and found to yield a profitable outturn. Last year sorghum was grown on a small area (15 cottahs), and the yield of grass in two cuttings amounted to 205 maunds 12 seers per acre. Reana was raised on 10½ cottahs of land; it yielded three cuttings, the outturn amounting to 238 maunds 18 seers per acre. An area of 12½ cottahs was newly planted during the year with Guinea grass. The crop shows a vigorous growth and promises to yield a heavy outturn for several years. The whole of the fodder raised on the farm was fed to farm cattle.

Tobacco.—An account was given in my annual reports for 1892-93 and 1893-94 of the experiments made in those years, to ascertain if several exotic varieties of tobacco could be profitably grown in Bengal, and if by means of proper curing they could be utilized for cigar-making; the report also contained a brief description of the character of each variety so far as it could be judged from its appearance in the field. The varieties grown last year were *hingli*, *Havana*, two varieties from Baroda, Dindigal, and *Landreth's*. Of these, *hingli* is the only variety grown in Lower Bengal. The crop yielded a fairly good outturn; but as the leaves are still in the process of curing, the outturn cannot be exactly stated, nor can anything be said about the quality of each variety. It is intended to submit a sample of each variety to an expert for valuation. It will be seen on reference to the Annual Report of the Sibpur farm for 1893-94 that the opinion then expressed by an expert as to the value of *Havana* and *hingli* tobacco gave ground for hopes that, with care exercised in curing and fermentation, tobacco suitable for the manufacture of cigars and cigarettes could be produced in Lower Bengal.

22. *Receipts and expenditure of the farm.*—The gross expenditure of the farm last year amounted to Rs. 2,590-15-2 against Rs. 2,433-12-9 in the previous year. The receipts amounted last year to Rs. 981-8-8 against Rs. 1,013-9-9 in 1893-94. These figures include Rs. 1,388-13-3 incurred in the actual cost of cultivation, and Rs. 882-11-6 realized by sale-proceeds of farm produce. The net cost of maintaining the farm last year was Rs. 1,609-6-6 against Rs. 1,420-7-0 in the previous year.

Agricultural experiments and introduction of new and improved staples in Government, Wards' and Private Estates.

23. The following is a brief account of agricultural experiments and introduction of new methods and staples undertaken, assisted or encouraged by this Department during the year in Government, Wards' and private estates:—

Burdwan Division.

24. *Burdwan—Private individuals.*—Mr. Banerjei, Assistant Director, reports that the number of Burdwan cultivators, who are adopting improved methods of cultivation of sugarcane, potatoes, and other crops as followed on the Burdwan farm, is steadily increasing. It was stated in the Agricultural Report of this Department for the year 1893-94 that the number of such cultivators who worked on improved methods in the year 1890-91 was only 3. The number in 1891-92 was only 4. In 1892-93 the number rose to 36, and in 1893-94 to 48. Last year 81 Burdwan raiyats adopted improved methods of cultivation with sugarcane, and undertook the cultivation of potatoes, jute, &c., with new and selected seed. Some of these cultivators came from villages situated at about 15 to 20 miles to see the operations of the farm. They readily receive the advice of the Overseer in charge of the farm; and it is reported by Mr. Banerjei that in many cases within his own knowledge he found that they were carefully cultivating their crops according to the farm methods. During the year under review, sugarcane cuttings, jute seed, seed of fodder grasses, and Naini Tal potatoes were supplied to neighbouring raiyats at cost price. Figures of outturn are not forthcoming; but it is reported that the results in all cases were very satisfactory. With Naini Tal potatoes, it was found that some raiyats obtained better results than those produced on the farm. Dr. Leather, who visited the potato fields of the raiyats last January, remarked that the crops were remarkably good. The Overseer in charge reports that the average outturn obtained by the raiyats amounted to 60 maunds per bigha, and that the highest outturn was over 80 maunds per bigha—results which may be considered highly encouraging. Fifty-five maunds of Naini Tal potato seed tubers were sold to the raiyats last year. Mr. Banerjei reports that there is likely to be a still larger demand during the current year.

The raiyats who undertook jute cultivation with Sirajganj seed supplied by this Department were satisfied both with the quality and quantity of the crop obtained.

In sugarcane cultivation the raiyats in the neighbourhood of Burdwan are giving up their local method of planting in irregular shallow furrows and are cultivating their canes in deep parallel trenches as demonstrated on the farm. *Ratooning* also finds favour with the raiyats.

In the experimental farm established at Burdwan by Babu Hara Dhan Pal, the operations in 1893-94 consisted of experiments with jute, sugarcane, and Naini Tal potatoes. Jute and *khari* sugarcane gave good results, and Naini Tal potatoes fair results.

25. *Hooghly Government Estates.*—The cultivation of jute from seed supplied by this Department in the khas mahals of the Serampore subdivision was very successful, as in the last year. The fibre is reported to be tough and strong, and is of the valued fine white colour.

26. *Midnapore Government Estates.*—Twelve maunds of Naini Tal seed potatoes were supplied by this Department to the Subdivisional Officer of Contai. Out of this, 8½ maunds were sold to persons desirous of making experiments. The remaining 3½ maunds were sown in land within the subdivisional compound, and yielded only 12½ maunds of potatoes—a very poor outturn. The failure is attributed to the depredations of ants. The same injury was suffered by some of the private experimenters; but some of them obtained a good outturn.

27. *Midnapore Wards' Estates.*—The cultivation of *khari* sugarcane and Naini Tal potatoes was tried on a small scale in the Malighati Ward's estate, with the result that the former yielded a slight profit and the latter a slight loss.

PRESIDENCY DIVISION.

28. *24-Parganas—Private Estates.*—Babu Chandra Nath Chaudhuri, who has some cultivation at Chatkaberia in Barasat subdivision, reports that he grew jute, sugarcane, paddy, sorghum, and peas during the year under report. Sugarcane cuttings and jute and sorghum seed were supplied by this Department at cost price, and the cultivation was carried on by Babu Chandra Nath Chaudhuri's son, who had served as an apprentice on the Burdwan farm in the year 1892-93. The results obtained were good. Sugarcane yielded 20 maunds of *gur* per bigha. The outturn of *jute* raised from the Rangpur seed supplied by this Department was the same as that produced from local seed; but it is reported that the Rangpur fibre was far superior and sold at a higher price. Paddy, sorghum, and peas gave good results.

29. *Khulna—Government Estates.*—A successful experiment was made in the cultivation of potatoes, a crop altogether new to the district. For this purpose, 10 maunds of Naini Tal seed potatoes and 10 maunds of bonemeal were supplied by this Department to the Collector of Khulna. The above were distributed as follows:—2 maunds of seed and 2 maunds of manure to the Chairman of the Khulna Municipality, 1 maund of each to the Naib of the Chandkhali khas mahal, and 7 maunds of each to cultivators in *char* Nehalpur. It is reported that khas mahal raiyats were not very willing to sow the seed, as some thought that if they grew it their rents would be raised, while others feared that compulsory cultivation would follow. Notwithstanding these objections good crops were obtained, and the potatoes were large and healthy. Figures of outturn have not been reported.

30. *Nadia—Private Estates.*—An account was given in the annual reports of the last two years of the farm established by Mr. B. Pal Chaudhuri, zamindar of Natuda. Several staples new to the district, viz., Naini Tal potatoes, oats, reana and Guinea grass, were cultivated during the year, and yielded a satisfactory outturn in each case. An attempt is being made by Mr. Pal Chaudhuri to improve the cultivation of tobacco, which is an important crop in many parts of the Nadia district. For this purpose, several new and well-known varieties of tobacco (namely, *Havana*, *hingli*, two varieties from Kaira in Guzrat, Dindigal, and an American variety called the Landreth's) were grown from seed supplied from the Sibpur farm. A satisfactory outturn has been obtained, and the tobacco, which is now in the process of curing, gives promise of a better quality than ordinary country tobacco. It is proposed, after the curing has been completed, to send samples to Europe for valuation, and to ascertain whether it is fit for use in the manufacture of cigars. The use of improved implements on this farm will be noticed in a later paragraph.

The Subdivisional Officer of Kushtia was supplied by this Department with 2 maunds of Naini Tal seed potatoes, which gave a very good outturn. The potatoes were also good in quality, being larger and whiter in colour than those sold in the local market.

31. *Jessore—Private Estates.*—At Magura Babu Bhabananda Chakrabarty grew mulberry on about two bighas of land. The leaves were used by him in rearing silkworms. The experiment proved to be successful, 97 ounces of seed-cocoons being sold by him for Rs. 97. At Mancelgunge, in the estate of Babu Lakhan Chandra Ash, potatoes were cultivated on a small scale in accordance with the instructions of this Department, and yielded a satisfactory outturn. An account of the use of the centrifugal sugar drier, otherwise known as the turbine, by Babu Jogendra Nath Basu, of Meherpore in Jessore, is given on page 19 of this report.

RAJSHAHI DIVISION.

32. *Rajshahi—Government Estates.*—The cultivation of Naini Tal and Khasia Hills potatoes was tried by nine raiyats of the Government estate Char Kidderpore. The seed was planted very late in the season owing to the rains having lasted later than usual. The outturn of potatoes, which was a little over five times the seed used, was fairly satisfactory. The Collector reports that the experience of last year has taught the raiyats the method of cultivation of a remunerative crop, and that eight out of the nine experimenters have preserved seed for next year. The potatoes are also reported to be of better quality than country potatoes.

33. *Rajshahi—Private Estates.*—The Manager of the Dighapatia estate cultivated Naini Tal potatoes on a bigha of land. Four maunds of seed were sown, and gave an outturn of 32 maunds of potatoes. The result was fairly satisfactory.

34. *Jalpaiguri—Government Estates.*—In the annual report of last year an account was given of the efforts to introduce the cultivation of Naini Tal potatoes in the Western Duars. It was found on enquiry that many jotedars had preserved seed from the produce of the previous year for cultivation during the year under report. The cultivation was further stimulated by a free distribution of seed potatoes again last year. Forty-two maunds of Naini Tal seed were supplied by this Department for the purpose to the Subdivisional Officer of Alipore, by whom the seed was distributed in small quantities free of charge among jotedars in the three tahsil circles of Falakata, Alipore, and Bhalka. The tahsildar of Falakata also obtained 10 maunds of seed potatoes from Calcutta for sale among the jotedars at cost price. As in the previous year, a vernacular leaflet giving simple directions about the cultivation of potatoes, oats and English vegetables, and the use of bone manure, was largely distributed among the jotedars. An excellent outturn of Naini Tal potatoes is reported to have been obtained, amounting in some cases to 10 or 12 times the quantities of seed used. The crop was damaged in some places by a species of cutworms which cut away the tender stems of potatoes and other vegetables and bored through the tubers. This damage is ascribed to the custom of using raw cowdung manure for potatoes. The tahsildar of Falakata was supplied by this Department with Rs. 19-8 worth of the seeds of various English vegetables. The seeds were sold to a few selected jotedars, and although sown too late, a satisfactory yield was generally obtained. Large cabbages and knolkohls are reported to have been grown locally for the first time, and were sold in numbers at the Falakata market. A similar attempt to grow English vegetables in Alipore did not meet with success.

In the small demonstration farm at Mainaguri, the only new staples grown during the year were several foreign varieties of tobacco and Naini Tal potatoes. The outturn of both these crops was very poor, owing, it is said, to rainfall at the sowing time. Sugarcane was also cultivated on the farm, and yielded a fair outturn, being 22 maunds of jaggery from an area of about $1\frac{1}{4}$ standard bighas. The cultivation proved highly remunerative from a pecuniary point of view. The object of growing sugarcane was to demonstrate to the jotedars the method of manufacturing jaggery, which was wholly unknown to them. The demonstration excited much interest among the cultivators, large numbers of whom came daily to watch the operation of boiling juice. It was shown that jaggery of very good quality could be locally made. The soil and climate of the Duars appear to be very well adapted for the extensive cultivation of sugarcane. This crop, like many others which call for frequent irrigation in other parts of Bengal, requires less watering in the Durgs owing to its moist climate, and can therefore be grown at comparatively less cost than elsewhere.

35. *Pabna—Government Estates.*—The cultivation of Naini Tal potatoes was tried in four villages in the Sirajganj subdivision. Except in one village, where the crop failed owing to the clayey nature of the soil, the crop yielded a good outturn.

36. *Dinajpur—Ward's Estate.*—Two maunds of Naini Tal potato seeds were sown in the Maldwar Ward's estate. The experiment proved a success. English vegetables, such as cabbages, cauliflowers, turnips and peas, &c., were also tried with satisfactory results.

Dacca Division.

37. *Dacca and Backergunge—Wards' Estates.*—Experimental cultivation of potatoes was made in the Talipabad Ward's estate in Dacca and in the Dakhin Shahbazpur Ward's estate in Backergunge. In neither case was the outturn satisfactory. The Collector of Backergunge, however, observes that the experiment has, to a certain extent, removed the wrong impression of the raiyats that the cultivation of this important crop would not succeed in any part of the Dakhin Shahbazpur estate.

Chittagong Division.

38. No agricultural experiments which need be noticed were made in any district of this Division, with the exception of the cultivation of English vegetables, which was successful in the Dohazari Ward's estate and in the estate of the Chakma Raja. The raiyats on these estates are reported to be taking to the cultivation of these vegetables. The Commissioner is of opinion that the English vegetables grown in the Chittagong district are, with the exception of cabbage, far inferior to those generally grown in India; but with a population so seafaring in its habit and with such scorbutic tendencies, their cultivation deserves the greatest encouragement.

Patna Division.

39. *Shahabad—Private Estates.*—The wheat crop in the Shahabad district almost totally failed in the season 1893-94 owing to a severe attack of rust. The wheat was specially defective in quality, and was scarcely fit for use as seed. Mr. Bhupal Chandra Basu, Assistant Director, suggested therefore that a large quantity of the seed of Muzaffarnagar soft white wheat, which had been found by the experiments in the Dumraon farm to be of as good quality as Buxar wheat No. 1, and to be even more productive, should be imported from the North-Western Provinces and distributed among the tenants of the Dumraon Raj. The suggestion was supported by Mr. C. A. Oldham, the Subdivisional Officer of Buxar. A meeting called by the Dewan of the Raj, Rai Jai Prokas Lal Bahadur, C.I.E., was held on the 16th August 1894, under the presidency of Mr. Oldham, and was attended by a large number of raiyats, and it was decided to import 25 maunds of selected Muzaffarnagar seed wheat for sale at cost price among the tenants. The Overseer of the experimental farm was sent to Muzaffarnagar to select and purchase the seed. This Department contributed Rs. 100 towards the cost of importing the seed. On arrival it was distributed to some 300 tenants of the Dumraon Raj in different parts of the Shahabad district. The Raj tahsildars were requested to keep accurate registers of the cultivation by each raiyat to whom seed had been sold. It is reported by the Commissioner, as well as by the officers of this Department who inspected many of the wheat fields, that the result was very successful considering the unfavourable character of the last *rabi* season. The yield of Muzaffarnagar wheat has been generally heavier than that of the local varieties, and it suffered less from rust, which again attacked the wheat crop last year. The cultivators who grew Muzaffarnagar wheat are said to have been pleased with the result, and to be desirous to grow it again next season.

40. An attempt to introduce the cultivation of Naini Tal potatoes among cultivators in the Arrah district met with satisfactory results. It had been found by experiments for a number of years in the Dumraon farm that the hill varieties of potatoes gave a larger yield than the local varieties, of which the seed is annually imported from Bettiah, Gazipur and other places in the plains. Fourteen maunds of Naini Tal seed potatoes were supplied last year to the Dumraon Raj, and were distributed in small quantities to a large number of market gardeners at Bhojpur, Dumraon and a few other villages. The sowing was much retarded in consequence of heavy rain in November; nevertheless the Naini Tal potatoes gave a much larger yield in almost every case than the local varieties planted alongside for comparison.

41. *Gaya—Government Estates.*—Experiments in the cultivation of Naini Tal potatoes and oats were made in the Government estates in Gaya. The cultivation of potatoes failed in consequence of the excessive moisture due to the prolongation of the rains, and in consequence also of the attack of a species of caterpillars, but oats yielded a fairly satisfactory result. Several new agricultural appliances were tried with results which will be noticed later on.

Bhagalpur Division.

42. No agricultural experiments were made in this Division, except the cultivation of Naini Tal potatoes in a few villages appertaining to the Maldwar Ward's estate in Purnea. The cultivation is reported to have been tolerably successful, and the cultivators who tried it are said to be satisfied with the results.

Orissa Division.

43. *Orissa—Government and Wards' Estates.*—The cultivation of sugarcane was tried last year in two villages in the Madhupur Ward's estate in the Cuttack district. Three varieties were grown, namely, *samsara*, *Bombay*, and *khari*. The crop in one village was considerably damaged by high flood in July; but on the whole a satisfactory result was obtained. The cultivation of Naini Tal potatoes was continued in the Khurda Government estate in Puri, and was tried in Banki and in the Madhupur Ward's estate. The result was disappointing in every case. It was found that, although the potatoes grown were of good quality, the outturn was too small to pay the expenses of cultivation.

44. A fine variety of paddy, the seed of which had been originally imported from Diamond Harbour, was again grown successfully last year in Singapore village in the Madhupur estate. The Sub-Manager of the Kujong estate made an experiment with long-stemmed paddy, the seed of which was obtained from Backergunge. It was sown in two villages, in one of which it was totally destroyed by flood, and in the other a fair outturn, though not equal to the produce of the country varieties, was obtained.

45. The efforts to introduce the Sirajganj variety of jute in the Cuttack district were again frustrated by excessive rain and high flood which washed away the standing crop.

Chota Nagpur Division.

46. The only agricultural experiments made in the Chota Nagpur Division under the directions of this Department were in the cultivation of Nani Tal potatoes by three private individuals, namely, Babu Rai Charan Ghosh, Personal Assistant to the Commissioner at Ranchi, another native gentleman at Purulia, and a cultivator at Jheria in the Manbhum district. In every case the result was satisfactory.

General remarks on Agricultural Experiments made in Bengal in 1894-95.

47. The preceding paragraphs of this chapter contain an account of the endeavours made by this Department to bring new staples and improved varieties of existing crops to the notice of cultivators in Bengal. On page 240 of his report on the Improvement of Indian Agriculture, Dr. Voelcker has observed that the introduction of new and improved varieties of crops from those parts of the country where they grow best to other parts where the crops are of inferior quality is a very useful kind of work to which attention should be directed. The crops to which attention has hitherto been given in Bengal are wheat, potatoes, sugarcane, and, in a minor degree, jute, paddy, oats and English vegetables. From a perusal of the account of the experiments made last year, it will appear that, in spite of not infrequent failures, the superior merits of Naini Tal potatoes as compared with the local varieties have been brought home to a numerous body of agriculturists in different parts of Bengal, and an attempt is being made to introduce the cultivation of these potatoes into districts where it was hitherto unknown. If the efforts now being made be persisted in, there is reason to hope that ere long the cultivation of Naini Tal potatoes will be established in some of the places where its cultivation is being tried. The distribution of Muzaffarnagar wheat last year to the tenants of the Dumraon Raj has also afforded a gratifying result; and the example of the Dumraon Raj is well worthy of imitation by other zamindars. The following remarks on the subject of experimental cultivation of new crops are made in the second annual report of Dr. Leather, Agricultural Chemist to the Government of India—

"In reference to new crops, I may refer quite briefly to the work which the officers in charge of the Bengal farms have been doing, since their efforts to introduce improvements in this direction appear to be at last meeting with success. In the neighbourhood of Dumraon improved varieties of potatoes and wheat, and at Burdwan potatoes and jute, have been imported, and not only grown at the farms but distributed to the raiyats. I visited villages at both places in January, and saw the potato and wheat crops, and there could be but little doubt, specially in the case of potatoes, that valuable assistance has been rendered to the people. The newly-imported potatoes were of a far more healthy nature than those generally

met with, and the people seemed well pleased with the change. Jute, too, is a new crop about Burdwan, and one which the people said could not be grown there; the people are now gladly taking up its cultivation."

48. It has been discouraging to the Director and to his Assistants that their efforts in the direction of introduction of new crops and improved crops were described in the Government Resolution on the Report for 1893-94 as "ludicrous" and "lamentable;" and it is submitted that they can be more justly appraised. It is certain that the work of improvement in this direction must be slow and only partially successful.

Yield of Crops in Jail Gardens.

49. In my last report it was stated that the result of the crop cuttings made in jail gardens during the year 1893-94 would be separately reviewed. A report on the subject was subsequently submitted to Government with my letter No. 3A, dated 4th January 1895. The Inspector-General has furnished me with a return of 34 crop cuttings made in 20 jail gardens in the year 1894-95, and has promised a further return of crop cuttings for 15 more jails. These returns will be separately reviewed and submitted to Government.

Crop-cutting Experiments by District Officers and Settlement Officers.

50. With a view to obtain information as to the average yield to the acre of the principal crops grown in these provinces, rules for the conduct of experimental crop cuttings were drawn up, and with the approval of Government circulated to all district officers with this office circular No. 48A., dated 13th December 1894, with the request that arrangements might be made to commence experimental cuttings. Under instructions of Government that arrangements should be made for crop-cutting experiments in Orissa with a view to the acquisition by the settlement staff of more knowledge than they possessed of the productive power of different classes of the soil, the Settlement Officers of Puri and Cuttack and Balasore were also instructed to commence crop cuttings during the last winter rice harvest.

51. Returns of 317 crop cuttings, made chiefly with rice, wheat, rapeseed, and mustard, have been received from 27 districts, and will be dealt with as soon as my Assistants can give the necessary time to compilation. It is intended that crop cuttings should be continued annually. The information thus collected will furnish the basis for the quinquennial return required by Government as to the average yield of crops.

Manufacture of Date Sugar by the Centrifugal Machine.

52. An account of the trials of the centrifugal sugar-drying machine, otherwise known as the turbine, held in the years 1892-93 and 1893-94 at a village in Jessore, was given in my last two annual reports. The experiments were considered to be fairly successful. During the year under report Babu Jogendranath Basu, a zamindar in the Jessore district, expressed the desire to try the machine on his own account; the machine was accordingly lent to him for use free of charge during last cold weather. He carried on the manufacture of sugar for nearly three months.

53. The following extract from the report of this gentleman's experiments may be of public interest, and will explain the manner in which the experiment was made and the experimenter's opinion as to the utility of the centrifugal machine:—

"In our part of the country it is somewhat difficult to procure jaggery suited for the turbine; and although it is available in small quantities, it sells comparatively dear. I am convinced that if suitable jaggery be available, and the machine worked to its fullest capacity (some 1¼ maunds of drained sugar per diem), the business will yield the desired profit.

"Machine-made sugar is not liked in our country, as it is wanting in the smell peculiar to country sugar. Consequently, I had to sell my produce rather cheap at Kesabpur. I believe, as matters now stand, that the turbine can be very profitably used in combination with the native process of manufacture. In that case, one would not pay dear for the jaggery. The better qualities could be then dealt with by the machine, and the inferior kinds in the native process. The two kinds of sugar may be mixed together, the mixture being likely to sell better than the machine-made sugar by itself. I did not extract *dalua* sugar (No. 2) by the turbine as had been previously done at Sagardauri. It would have

entailed loss if I had done so, as the outturn would have been less and of inferior quality than by the native process. I therefore adopted the local method of extracting sugar from the molasses drained from No. 1."

54. The following is the experimenter's statement of produce, expenditure and receipts:—

Statement of Produce, Receipts and Expenditure.

I. Produce—

	Mds.	s.	ch.
Quantity of sugar, No. 1, made by the turbine out of 140 mds. 12 seers of jaggery	40	1	0
Quantity of sugar, No. 1, made from original jaggery by the native process	4	20	0
Quantity of sugar, No. 2, extracted from molasses drained from sugar, No. 1	10	27	8
Estimated quantity of sugar, No. 2, still remaining on hand	5	10	0
Total Produce ...	60	18	8

II. Receipts—

	Rs.	A.	P.
Value of 58 mds. 8½ seers of sugar sold	414	0	0
Estimated value of 5¼ mds. of sugar in stock	40	0	0
Estimated value of 37 pots of molasses @ 3 Rs. each ...	111	0	0
Miscellaneous receipts	8	8	3
Total Receipts ...	573	9	3

III. Expenditure—

	Rs.	A.	P.
Price of 158 mds. 33 seers of jaggery	463	15	3
Establishment charges	55	6	6
Price of utensils and appliances	15	1	4½
Cost of bringing jaggery, fuel, &c.	8	15	7½
Price of fuel	18	11	0
Miscellaneous	1	0	0
Total Expenditure ...	563	1	9
Estimated profit	10	7	6

The experimenter has asked for the use of the turbine for another season, and intends to manufacture sugar with it next season on a larger scale.

AGRICULTURAL IMPLEMENTS.

55. *Ploughs.*—From the recent reports it appears that the Sibpur plough as reported last year is well adapted for breaking up light soils, but is not suitable for working in stiff, low, wet lands. Mr. J. Crowdy, of Darbhanga, who has in previous years given a favourable opinion on this plough, reports that he still uses it. The Survey Commissioner and Director of Land Records and Agriculture, Bombay, who has arranged for experimental use of the plough in the Bombay Presidency since the year 1891, sends the following remarks:—

"This implement is cheap, light of draft, and serviceable when the soil is moist and easily moved. It is too frail an implement to be used in the soils of the Deccan except during the monsoon, and even then cannot be used so soon after rain as a wooden indigenous implement can. It has neither the strength nor the durability of a well-constructed Deccan plough, nor has it, in my opinion, any advantage over that implement in penetrative power or otherwise. It has a better chance of being successfully introduced into Gujrat than into the Deccan, because in Gujrat the indigenous plough in common use is by no means an effective implement."

The Deputy Collector of Broach reports that of the 12 ploughs purchased 4 are actually in use at present, and feels sure that the remaining ploughs will come into favour in due course, the advantages of the plough being that it works much deeper and turns over a given area of land far more expeditiously than the Gujrat plough. Mr. Pal Chaudhuri, of Natuda in the Nadia district, reports that the six Sibpur ploughs which are being worked in his farm are giving excellent results in ploughing up light soils for the first and second

times. The Manager of the Dighapatia estate reports that as last year the Sibpur plough was not much used on account of its being too heavy for the bullocks of the country. The Superintendent of the Purnea Jail reports that the plough worked well during the year.

56. *Baldeo plough.*—The Collector of Faridpur reports that the Baldeo ploughs supplied to him have proved a failure, as they are too heavy for the country bullocks.

57. *American hand hoes.*—Babu Jnanananda Chakravarti, of Magura, district Jessore, who was supplied with an American hoe by this Department in 1894 on payment of the price of Rs. 18-12, reports that he found the hoe very useful, especially in the cultivation of potato and mulberry, and that it is well worth the price.

58. *Tube wells.*—In the report for 1893-94 it was stated that Mr. N. G. Mukerji, Deputy Collector on special duty, would make another trial with tube wells in Babu Ashutosh Nath Roy's estate in Murshidabad. Mr. Mukerji reports, however, that the tube wells were not worked at all during the year under report, as the Executive Engineer, Nadia Rivers Division, who was consulted in the matter by the Manager, expressed an opinion that tube wells were not likely to succeed in the Nadia district. Some correspondence was carried on with the Board of Revenue on the subject of sinking tube wells in the Government estates in the Hooghly district on lines proposed by Mr. R. D. Oldham, Superintendent of the Geological Survey of India. The Collector of Hooghly reported that such wells would be a blessing in every village in the district. The Board ultimately decided that the funds provided for this purpose in the budget estimate for the year should be appropriated to sinking artesian wells in the Western Duars; but Government in Public Works Department letter No. 1706M.P.I., dated 4th April 1895, refused to spend money on this object as success appeared to be unlikely.

59. *Sugarcane mills.*—The Commissioner of Rajshahi reports that the Behea sugarcane mills continued to be used by the raiyats of the Maldwar Ward's estate in Dinajpur with success. In the Sankarpur Ward's estate also, the Behea sugarcane mills are greatly used by the raiyats. A special report on the subject of the use of iron mills for crushing sugarcane in these provinces has recently been submitted to Government.

60. *Iron thresher.*—An iron thresher made by Messrs. Burrows, Thomson, and Mylne was tried by several raiyats in the Arrah district, and at the Government dairy farm at Chirat near Aligarh in the North-Western Provinces. The result is reported to have been satisfactory. The experiments made with this machine at the Dumraon experimental farm are described on page 9 of this report.

EXPERIMENTS MADE BY THE AGRI-HORTICULTURAL SOCIETY OF INDIA.

61. The Secretary to the Agri-Horticultural Society has favoured me with the following notes on experiments made during the year with fodder plants, economic and fibre plants, and with manures:—

Fodder Experiments.

"*Lalthyrus silvestris.*—After attaining a height of 9 inches the entire plot* of seedlings perished in July. Mr. A. Cooke, Ranchi, is the only one who reports success. The majority of his plants are still alive and appear to be thriving.

Cicer arietinum.—The three varieties of Spanish gram imported in 1893 produced crops altogether disappointing, being poor in quality, and, as compared with the original seed, had deteriorated in size.

Reana Luxurians.—Former experiments have conclusively proved the value of this fodder plant. No fresh experiments were tried in 1894.

Cytisus proliferus albus.—Seedlings after attaining a height of about 4 feet perished last September. Mr. A. Cooke, Ranchi, reports that his are still alive.

Australian Oats.—A small quantity labelled 'black grain' received from a correspondent in South Australia failed to germinate in successive sowings.

Guinea grass.—The small plantation at the nursery was transferred to a low lightly manured bed at the commencement of last rains and yielded better results than in the 1893 experiment; but owing to carelessness of the head gardener no weight of cut grass was kept.

Polygonum sachalinnse.—Plants have been raised from seed, and a few will be available this season. It appears to have withstood the present dry weather very well.

* Apparently at Alipore.

Economic and Fibre Experiments.

Kolanut (*Cola-acuminata*).—The young plants at the nursery are doing well. Those sent to the foot of the hills were killed by the cold.

Erythroxylon coca.—A large number of seeds and seedlings were again distributed, but no report of experiments in connection with the leaf has been received. It is useless to attempt such experiments in Calcutta.

Cæsalpina coriaria (Divi-Divi).—Large quantities of seed were distributed during the year.

Agave rigidaror sisalana (sisal).—The young plants at the nursery are thriving. There was scarcely any demand for plants last year.

Tobacco.—The results of tobacco experiments have been far from satisfactory. Reports are scanty in detail, and samples of leaves in all cases poor in quality. Native cultivators do not appear to be at all keen on improving their present method of cultivation and curing of leaf.

Cotton.—A small quantity of seed of an Egyptian variety was received from the Reporter on Economic Products to the Government of India last May; the produce is in every way identical with that obtained from seed received from Captain Pireno, who styled it the Egyptian long staple.

Potatoes.—Experiments tried by members and others to whom tubers were distributed have not been satisfactory. In some cases the tubers were lifted too early; in others it was apparent all large specimens had been kept back. Australian potatoes again failed.

Swedes, Mangels, Oats, Barley, Wheat, Sorghum, Indian-corn.

The result of the distribution of seed to cultivators and others may be summed up as *nil.* Enquiries for reports have in the majority of cases been unanswered.

Adhatoda vasica (Bakas).—Experiments conducted at the gardens did not prove satisfactory. Reports from Assam, however, appear to be favourable, and a valuable insecticide is no doubt coming to the front in Bakus.

Manurial Experiments.

Bonemeal.—The experiment of dry rotting, as mentioned in the last report, was again tried this year with excellent results, the dry rotted meal proving much quicker in action than when used in the ordinary manner.

'Ar' (Mountain Goat's Dung).—Reports on experiments with this manure are not yet to hand. In the Society's garden a small quantity was tried on camellia plants, which yielded plentiful crop of new leaves and flowers.

Bat manure.—A sample was received from Messrs. Finlay, Muir & Co., but had to be used in a considerably diluted form to tender plants, and when mixed with equal quantities of soil to hardier ones. The quantity received was, however, too small to enable me to give a reliable report."

This Department is indebted to the Society and also to the Chamber of Commerce for the cordial co-operation and ready aid which has been rendered during the year in all matters referred to them.

CHAPTER V.

BENGAL VETERINARY DEPARTMENT—CATTLE-BREEDING.

62. *Bengal Veterinary Department.*—The work of the Civil Veterinary, Department, Bengal, during the year may be noticed, firstly, with reference to the management of the Bengal Veterinary Institution, and secondly, with regard to work done in the districts.

63. The Committee of Management of the Bengal Veterinary Institution, working in consultation with the Superintendent during the year, consisted of the following members:—Rai Bahadur Sheo Baksh Bagla, Dr. Kailash Chandra Bose, Mr. W. B. Gwyther, and the Director of Land Records.

Committee of Management of the Bengal Veterinary Institution.

The Committee met three times during the year, viz., on the 26th April, 4th December 1894, and 22nd March 1895. Mr. Gwyther was on furlough from 4th April 1894, and was present only at the meeting held on the 22nd March 1895. The other members attended all the three meetings.

The principal business done at the meetings was as follows:—

Monthly returns of admission of animals and of attendance of students were examined;

Government stipends and the Sheo Baksh Bagla scholarship founded by Dr. K. Macleod were awarded;

Rates of fees for admission of animals were revised;

Appointments of Lecturers in the Bengal Veterinary Institution were approved;

Arrangements for the annual examination were considered;

The proposed extension of Act XI of 1890 (Cruelty to Animals Act) to Calcutta and Suburbs was discussed;

Arrangements with the Cossipore-Chitpur Municipality for laying on water in the Bengal Veterinary Institution were discussed.

Admission of animals into the Bengal Veterinary Institution for treatment.

64. From the 1st April 1894 to the 31st March 1895 662 animals were treated in the Bengal Veterinary Institution at Belgachia, viz., 330 as in-patients and 332 as out-patients. Of the animals treated, 285 were horses and mules, 312 were cattle, 53 were dogs, and 12 were sheep and goats. The daily average number of animals treated was 31. One hundred and sixty-nine operations of all kinds were performed. I agree with the Superintendent, Captain W. D. Gunn, that this is not an unsatisfactory number of patients for the first year of the existence of the Institution.

The proposal made by Captain Gunn, that the Bengal Veterinary Institution should be declared an infirmary for animals within the meaning of sub-section (2) of section 6 of Act XI of 1890 (An Act for the Prevention of Cruelty to Animals), was further discussed during the year. The legal difficulties were found, however, to be insuperable (Government letter No. 5847-Agri., dated 31st December 1894).

Students in the Bengal Veterinary Institution.

65. At the end of the year 28 students were regularly attending lectures. Of these, one Surendranath Bose (who passed first in an examination held in November 1894 and eighth in the examination of March 1895) holds the Sheo Baksh Bagla scholarship of Rs. 10 a month founded by Brigade-Surgeon-Lieutenant-Colonel K. MacLeod; 14 students were in receipt of the Government stipends of Rs. 5 a month, and 2 hold stipends of Rs. 10 a month given by the Municipal Commissioners of Darjeeling. Looking to the uncertainty of future employment being found by the students who pass out of the Bengal Veterinary Institution, the number of students is probably as large as can be expected.

Of the 28 students, 26 appeared at the examination held in March by three officers of the Army Veterinary Department, and 20 obtained qualifying marks. Two students were unable to go up for examination because they were ill with small-pox.

Cattle disease and glanders.

66. Captain Gunn writes that cattle disease appears to have been more prevalent in these provinces during 1894-95 than in the previous year. Trustworthy statistics of cattle disease in these provinces do not, however, exist; and it will be long before they can be looked for. Reports of rinderpest were received during the year from Mymensingh, Chittagong, Rangpur, Jalpaiguri, Rajshahi, the 24-Parganas, Murshidabad, and Jessore; and reports of foot-and-mouth disease from the Chittagong Hill Tracts, Darjeeling, Balasore, and the 24-Parganas. No reports of anthrax were received by the Superintendent of the Civil Veterinary Department during the year. Directions for the treatment of foot-and-mouth disease were written by Captain Gunn, and were translated into the vernacular and circulated by the Deputy Commissioner of Darjeeling, Mr. R. T. Greer, C.S. Captain Gunn promises to draw up directions for isolation of cattle suffering from contagious disease and for disinfection of the ground where they have been herded.

Cases of glanders were noticed by Captain Gunn at the Sonepur fair and at the Berhampore fair in Shahabad; and a horse with glanders was brought to the Bengal Veterinary Institution and was handed over to the police for destruction. In my letter No. 2478A., dated 3rd October 1894, a report was submitted to Government on a proposal to extend the Glanders and Farcy Act, XX of 1879, generally in these provinces. The practical difficulty in the way of extending either Act XX of 1879 or Act VIII (B.C.) of 1880 lies in the fact of the want in the districts of Veterinary Surgeons. It is not certain that the Veterinary Assistants who will pass out of the Bengal Veterinary Institution in the course of the next few years will supply this want.

Cattle-breeding.

67. Under arrangements made by the Superintendent of the Civil Veterinary Department, two bulls were brought from Burma and supplied to the Collectors of Tippera and Mymensingh. One Nellore bull was obtained by the Superintendent of the Civil Veterinary Department, Bengal, from Madras, and supplied to the Manager of the Bettiah Raj. Two bulls from Bankipore were supplied to the Chairman of the Hooghly and Chinsura Municipality and to the Superintendent of the Jessore Jail. The Magistrate of Mymensingh reports that the Burman bull which arrived during the year covered a few cows. The Manager of the Sarail estate in Tippera, to whom a Burman bull was supplied through the Collector of Tippera, reports that the bull arrived ill. Subsequently some cows were brought to it, but it did not serve. The Manager of the Bettiah Raj reports that he is much pleased with the Nellore bull supplied to him, but as the animal is very young, he has not yet been allowed to serve cows. The Chairman of the Hooghly and Chinsura Municipality reports that the Bankipore bull supplied during the year has served 13 cows, and that fees at the rate of 8 annas a cow have been levied. The Superintendent of the Jessore Jail reports that the Bankipore bull has improved much in health, but has now almost lost his breeding power. Since his arrival at the Jessore Jail he has covered only 4 cows.

With regard to bulls supplied in previous years to jails, municipalities and Government estates, the following information has been received in my office:—As reported before, the Hissar bull in the Krishnagar Jail has got good stock, but is gradually losing his breeding power on account of old age. The Hissar bull in the Tippera Jail covered 7 jail cows and 40 other cows during the year under report. Of the 7 jail cows, 6 calved. Of the other cows, the Superintendent of the jail is not able to report anything. The Superintendent states that the 5 jail calves got last year show a little improvement in the local breed of cattle. The Hissar bull in the Midnapore Jail has recently died. He had of late become useless for breeding purposes. At the Bhagalpur Jail all the cows in the jail were served by the Hissar bull during the year. The calves are reported to be very good. The Collector of Shahabad reports that one English and two Hissar bulls, maintained in the Government estates at Nasriganj, Buxar and Arrah, have continued to be useful. They were largely used by Government raiyats and private zamindars, and served 231 cows. The Subdivisional Officer of Sasaram reports that the stock of the Hissar bull at Nasriganj sells for better prices than that of ordinary bulls. At Arrah the calves of cows covered by the English bull are said to be very fine animals, and to resemble in appearance the English bull. The Hissar bull at Buxar has grown very old, and another is required in his place. The Sub-Deputy Collector in charge of Mynaguri Tahsil reports that one of the two Bachour bulls died during the year, and that the other has not been of much use.

Veterinary dispensaries.

68. Estimates and plans for veterinary dispensary buildings to cost Rs. 2,035 were drawn up by Captain Gunn during the year and were submitted to Government with my letter No. 42, dated 9th January 1895. In reply Government intimated, in letter No. 489Agri., dated 23rd January 1895, that under present circumstances no contribution from Provincial revenues can be made towards the cost of establishment of such dispensaries in the mufassal.

Captain Gunn expresses the hope (paragraph 108 of his report) that such dispensaries will soon be in working order. Except, however, as regards the Muzaffarpur district, I fear that this is too sanguine an anticipation. In Muzaffarpur a local committee has guaranteed a monthly income of Rs. 75 a month and free quarters to a Veterinary Assistant, and Ghulam Kadir, overseer of the Bengal Veterinary Institution, has been sent to take up this post.

Districts visited by the Superintendent.

69. Captain Gunn visited the following districts during the year for the purpose of combating and investigating cattle disease in connection with fairs and in order to make enquiries with regard to cattle-breeding:—the 24-Parganas, Shahabad, Patna, Darbhanga, Darjeeling, Jalpaiguri, Jessore, Midnapore, Purnea, Dinajpur, Saran, and Murshidabad.

70. The provincial expenditure of the Civil Veterinary Department in Bengal during the year (exclusive of the pay and travelling allowance of the Superintendent) amounted to Rs. 13,824-1-5, and was made up as follows:—Assistant Superintendent's salary, Rs. 3,000; Lecturers' salaries, Rs. 1,934-4-4; establishment pay, Rs. 3,183-8-5; students' stipends, Rs. 850; feed of animals, Rs. 1,129-9-6; contingencies, Rs. 3,200-6-0; Assistant Superintendent's travelling, Rs. 7-8; establishment travelling, Rs. 518-13-2.

Expenditure.

71. *Pigs.*—In last year's report it was stated that two Berkshire pigs were sent to the Political Officer in Sikkim for breeding purposes. The Political Officer reports that the pigs have not bred well; the sow has had only two litters of one each.

CHAPTER VI.

AGRICULTURAL STATISTICS.

72. General forecasts of harvests, special reports of crops and other agricultural statistics were prepared and published by this Department during the year as follows:—

(1) *Rabi.*—Forecasts of the outturn of rabi crops of 1893-94 and of important special crops, viz., sugarcane, tobacco, mulberry and poppy, were issued on the 4th April 1894.

(2) *Bhadoi.*—Preliminary forecasts of the bhadoi crops for the year 1894 were submitted to Government on the 3rd October 1894.

(3) *Bhadoi.*—A final estimate of outturn of the bhadoi crops, 1894, was submitted to Government on the 18th December 1894.

(4) *Winter Rice.*—A first forecast of the winter rice crop, showing the area and prospects of the crop up to 15th September 1894, was issued on the 11th October 1894.

(5) *Winter Rice.*—A final estimate of the winter rice crop was submitted to Government on the 8th December 1894.

(6) *Wheat.*—A final estimate of the wheat crop of 1894 was submitted to Government on the 21st May 1894.

(7) *Wheat.*—A first forecast of the outturn of the wheat crop of 1895 was submitted on the 1st February 1895.

(8) *Jute.*—A first forecast of the jute crop of 1894, showing the state of the crops up to the 15th June 1894, was issued on the 29th June 1894.

(9) *Jute.*—A final forecast of the jute crop for season 1894 up to 15th August was submitted on the 30th August 1894.

(10) *Oilseeds.*—A final forecast of the oilseed crops for the year 1893-94 was submitted on the 21st May 1894.

(11) *Oilseeds.*—A first forecast of the oilseed crop for the year 1894-95 was issued on the 20th February 1895.

(12) *Cotton.*—A report on the early cotton crop was issued on the 4th December 1894.

(13) *Cotton.*—A report on the late cotton crop was submitted on the 4th February 1895.

(14) *Minerals and gems.*—Statistics of the production and value of minerals in each district of Bengal during the calendar year 1894 were compiled during the year from the returns of the district officers, and submitted to the Reporter on Economic Products to the Government of India on the 15th April 1895.

(15) *Agricultural implements.*—A list of agricultural implements and machines which have been tested in Bengal during the year ending 30th September 1894, and of those in use which are reported to have met with more or less marked success, was submitted to Government on the 14th November 1894, and published for general information.

Tables of agricultural statistics for 1893-94 were prepared during the year in accordance with Bengal Government Resolution No. 1772, dated 4th May 1892, and were submitted to the Board of Revenue, Lower Provinces, on the 8th February 1895.

CHAPTER VII.

MISCELLANEOUS.

73. *Applications for patents for inventions.*—Twenty-four applications for patents of an agricultural character were received during the year from the Government of India, in the Revenue and Agricultural Department, and opinions of experts were obtained on them. Of these, seven were applications for patents connected with the tea industry, and were sent to the Secretary to the Indian Tea Association for opinion, four were applications for patents connected with the indigo industry, and were sent to the Secretary to the Indigo Planters' Association. The remaining 13 applications were for patents connected with agricultural implements, presses for extracting oil from oilseeds, inventions for extracting fibres, a roller for cotton gins, a portable hand-shearing machine, a machine for converting raw lac into shell-lac, and an invention for sifting salt. These were sent to the Secretary to the Agri-Horticultural Society of India, who obtained the opinions of Messrs. A. Parry and J. K. Green, members of the Institute of Civil Engineers, on the applications.

74. *Agricultural Exhibitions.*—Agricultural exhibitions are held during the year at Cossipore, Kalimpong, Khulna, Goalundo, Berhampore in Shahabad, Tentanga in Bhagalpur, and Jaygunge in Dinajpur. Of these the exhibitions mentioned on the margin were assisted with grants of money noted respectively against them out of the allotment for public exhibitions and fairs. The two fairs annually held at Alipur and Falakata in the Western Duars were also assisted with grants of Rs. 200 and Rs. 300 respectively out of the abovementioned allotment. The exhibitions held at Goalundo, Tentanga, and Jaygunge did not receive any Government subsidy. A brief notice of each of these shows and fairs is given below.

	Rs.
Cossipore	250
Kalimpong	400
Khulna	250
Berhampore	250

The Cossipore exhibition, which was held for the sixth time in February 1895, was visited by a large number of people from Calcutta and the neighbourhood. The agricultural section of the exhibition did not materially differ from its predecessors, but the show of silkworms and fabrics, organised in the previous two years by Mr. N. G. Mukerji, was wanting owing to Mr. Mukerji being occupied with other work. As in previous years, this Department offered prizes at the show for cattle, sugar, dairy produce and agricultural implements, but, except as regards cattle, very few exhibits were forthcoming under any of these heads. Various agricultural implements and machines were exhibited at the show by officers of this Department, and demonstrations were also made of the method of manufacturing butter by means of European machinery and of making jaggery in shallow pans as recommended by Messrs. Thomson and Mylne, of Beheea, and were watched with interest by a number of visitors. Pamphlets and reports both in English and the vernacular prepared by my Assistants on agriculture were largely distributed to interested visitors at this exhibition and other exhibitions. It is believed that much interest is aroused in improved agricultural methods by means of these pamphlets.

The Kalimpong exhibition in the Darjeeling district is held in connection with an annual fair. It is mainly an exhibition of live-stock, although various kinds of local produce are also exhibited. The exhibition was held last year on the 27th and 28th November, and was attended by Captain Gunn, the Superintendent of the Civil Veterinary Department. Captain Gunn reports that 250 mules were brought from Tibet for sale. This was considerably in excess of the number brought in the previous year. The Artillery and the Transport Department purchased 171 mules between them against 100 purchased in the preceding year. Captain Gunn speaks well of the qualities of the Tibetan and China mules; and the Inspector-General of the Civil Veterinary Department has recommended that every encouragement should be given to the Kalimpong fair, as it promises to be one of the best mule markets in India. The show of Bhutea ponies is reputed to have been fairly good; but cattle were poorly represented owing to mortality caused by rinderpest in the previous year.

The Berhampore Agricultural Exhibition in the Arrah district was held in February 1895, and was arranged chiefly through the exertions of Mr. C. E. Oldham, the Subdivisional Officer of Buxar. It was the second exhibition held at the place, the first having been held in 1886. Berhampore contains a Hindu shrine, where a large fair is held twice in the year in February and May. Cattle, horses and ponies are largely sold on these occasions. The agricultural exhibition was very numerously attended by people from the neighbouring country and was fairly successful. A large assortment of implements and machines was sent by this Department, and a collection of garden tools and implements was sent by Messrs. T. E. Thomson & Co., of Calcutta. Mr. Basu, who attended the show, reports that the working of several machines and implements, among others, the Sibpur plough, dairy machines, a chaff-cutter, a maize-huller, sugar turbine, and some pruning tools, excited much interest. The sugar turbine is used in some parts of the Shahabad district, but the quality of sugar turned out by the machine is very inferior. It was demonstrated at the show that from some carefully prepared *rab* or jaggery such as is made at the Burdwan farm, sugar of very fine quality could be prepared by the turbine. Among agricultural products, the most noticeable were specimens of Muzaffarpur wheat plants in ears and Naini Tal potatoes, both of which were grown from seed distributed from the Dumraon farm among tenants of the Dumraon Raj, as well as a sample of fine *bansmati* rice grown at the Dumraon farm from seed imported from Dehra Dun, and some red canes grown by a cultivator from cuttings brought by him from the Mauritius. Captain Gunn, Superintendent of the Civil Veterinary Department, attended the show, and assisted in the judging of live-stock. Prizes, amounting in the aggregate to about Rs. 800, were awarded to successful competitors. Some 500 copies of a pamphlet written by Mr. Oldham in the local vernacular describing in simple language some of the methods followed and results obtained on the Dumraon farm were distributed among the prize-winners.

The Khulna Agricultural Exhibition held from 21st February to 7th March 1895, the fifth of its kind held since 1889-90, was attended by Mr. Nagendra Nath Banerjei, Assistant Director, who showed implements and machines at work. Mr. Banerjei reports that Naini Tal potatoes and *gur* from the Burdwan farm attracted great attention. The exhibition was well attended and was as great a success as those of previous years. The amusement part of the exhibition was worked by a Sub-Committee different from that sitting for the actual work of the exhibition proper. The chief feature in the exhibits of grain was a good collection of different varieties of paddy grown in the district. The only good exhibit of Naini Tal potatoes came from the jail. Besides grain, vegetables and live-stock were also exhibited, and there was an industrial section.

The agricultural exhibits at the show held at Tintanga in the Bhagalpur district in February were few in number, but are said to have excited much interest. This exhibition did not receive any grants from the funds of this Department; but a collection of agricultural products and some agricultural pamphlets were sent by this Department.

The Jaygunge Agricultural Exhibition in the Dinajpur district was held in October 1894. The expenses of the show are met by the zamindar, Babu Parbati Sunkar Roy, of Teota. A collection of implements and machines was sent to this exhibition by this Department; and an overseer was sent to demonstrate their working. The working of the Sibpur plough was watched with interest by a number of cultivators, many of whom themselves tried it. It was considered to be rather heavy for the small cattle of the district.

The Alipur and Falakata fairs are intended to give an impetus to trade in general, and to trade between Bhutan and British territory in particular. The fair held at Alipur last year lasted from the 20th of January till the end of the month. It was not so successful as was anticipated, owing, it is said, to the movements of troops from Buxar, which made shop-keepers apprehensive of the seizure of their carts, and thus kept them away. The Falakata fair, which lasted from the 31st January to the 14th February 1895, was more successful. It was attended by 253 shop-keepers from Bhutan and the neighbouring British districts, and articles of the estimated value of Rs. 34,500 were sold.

SUPPLY OF SEEDS, IMPLEMENTS, MANURES, &c.

75. Seeds, implements and manures were distributed by the Department to the extent noted below, during the year under report, in most cases at cost price:—

	Seeds.	Quantity.	Number of persons supplied exclusive of the three experimental farms.
		Mds. S. Ch.	
1.	Potatoes	302 5 0	56
	Muzaffernagore wheat, &c. ...	250 0 0	Distributed to raiyats of the Dumraon Raj.
2.	Jute	3 7 8	14
3.	Gram	3 0 0	2
4.	Tobacco	0 1 10	11
5.	Oats	2 0 0	1
6.	Barley	1 0 0	1
7.	Guinea grass	2 9 0	1
8.	Sorghum	0 1 0	1
9.	Reana	0 10 0	1
10.	Sunn	0 21 0	2
11.	Paddy	1 36 0	1
12.	Cabbage	0 0 1	1
13.	Cotton	0 1 0	1
14.	Babul	0 1 0	1
15.	*Potol* roots	1 0 0	1
16.	Mitha *palong*	0 1 8	1
		Rs. A. P.	
17.	Beet	1 12 0 worth	5
18.	English vegetables	9 15 0 „	23
		Kahans. Pons.	
19.	Sugarcane cuttings	14 7 4	
	Implements.		
		No.	
1.	Sibpur plough	2	2
2.	American hoe	1	1
3.	Iron wheels	2	1
	Manures.	Mds. s. ch.	
	Bonemeal	12 0 0	2
	Castor-cake	91 0 0	30
	Gypsum	8 0 0	1

COST OF AGRICULTURAL EXPERIMENTS.

76. The total cost to Government of agricultural experiments and enquiries conducted under the supervision of the Department of Land Records and Agriculture during the year under report, inclusive of the cost of implements and seed grain and of the collection and photographing of local agricultural implements, was Rs. 9,428-6-1 against Rs. 8,895-8-9 in the preceding year. The details are as follows:—

		Rs.	A.	P.
1.	Maintenance of the Sibpur farm	2,590	15	2
2.	Experiments other than those made in the experimental farms	2,153	1	6
3.	Pay and travelling allowance of agricultural overseers	1,202	8	1
4.	Collection and photographing of native implements	575	8	9
5.	Cost of constructing overseer's quarters at Sibpur farm	500	0	0
6.	Government grant towards the silk experiments at Alipur	500	0	0
7.	Cost of feeding and keeping donkey stallion in Sikkim	330	2	1
8.	Cost of exhibiting implements and machines, &c., at the different agricultural shows	372	8	0
9.	Government grant towards fodder experiment at Ranchi	200	0	0
10.	Purchase and repair of implements	231	8	9
11.	Freight, &c., of bull obtained for breeding purposes...	39	2	6
12.	Miscellaneous	732	15	3
	Total ...	9,428	6	1

OFFICERS OF THE DEPARTMENT.

77. Messrs. Bhupal Chandra Basu and Nagendra Nath Banerjei, Assistant Directors, have continued to manage the whole of the work connected with agricultural experiments and improvements undertaken by this Department except the sericultural work, and have done most of the work of writing the periodical notes on the harvests. Both of these officers are highly qualified, painstaking, and deserving. The work of Mr. Nitya Gopal Mukerji, Deputy Collector on special duty, in connection with silkworm disease has been separately reported. Babu Hari Sakha Das, a clerk in the Director's office, has done good and careful work in compilation of returns.

Delay in submission of the report.

78. I have to express regret for delay in submission of this report, which was due on the 31st July. The delay has been caused by the serious illness of Mr. Basu and by the illness also of Mr. Banerjei.

I have the honour to be,

SIR,

Your most obedient servant,

W. C. MACPHERSON,

Director of the Department of Land Records and Agriculture, Bengal.

APPENDIX.

PAGE.

Mr. Nitya Gopal Mukerji's report on silk experiments . . . . . i—xiii

APPENDIX TO THE REPORT OF THE AGRICULTURAL DEPARTMENT FOR 1894-95.

No. 21, dated Berhampore, the 25th April 1895.

From—Babu Nitya Gopal Mukerji, Deputy Collector, on special duty,
To—The Director of the Department of Land Records and Agriculture, Bengal.

I have the honour to submit my annual report for the Silk Experiments for 1894-95. The experiments were carried on in nine centres, viz., at Kagachira, Jot and Mehedipur in Malda; at Duna and Batnagar in Birbhum; at Magura in Jessore; at Kalimpong in the Darjeeling district; at Pokhuria in Manbhum and at Berhampore.

Kagachira.

2. The experimental station at Kagachira is the most interesting of all the stations, being the first established by a peasant rearer of silkworms after the plan he learnt at Berhampore. The continued success of this station for nearly three years has prompted hundreds of cocoon-rearers to follow new methods of work as much as possible. Some have taken to the use of thread-nets for cleaning the worms; some use sulphate of copper for *leping* their rearing-rooms and *dálás;* some have come to recognise sulphur fumigation as a certain remedy against muscardine; and some have taken to seeding on sheets of paper and afterwards dipping the sheets in sulphate of copper water as a protection against *flacherie;* and a great many use only the experimental seed. The seed-rearing house at Kagachira is, in fact, looked upon by those rearers of Malda and Birbhum who have taken to new practices as a model *magnanerie.* I have been very anxious, therefore, that it should lack nothing, and that it should continue to supply good seed and serve as an open place for instruction. Kagachira itself, though situated at the very north-western outskirt of the silk-growing region of Bengal, is a silk-rearing village, and it was considered an important step to remove the trained rearer, Dandadhar Das, to the neighbouring village of Araidanga, where no silk-rearing is done, but where there is a school where children of cocoon-rearers from the neighbouring villages come for instruction, and where also there is a post office. The new methods of work which have been introduced with success among a few cocoon-rearers of Malda and Birbhum are sufficiently numerous and complicated to make it necessary to spread an adequate knowledge about them through the medium of schools situated at or near silk-rearing villages. The removal of Dandadhar Das to Araidanga was also found necessary for another reason. Great inconvenience was felt at Kagachira every now and again in the matter of receipt or despatch of postal parcels. The most important crop of the year for seed purpose (viz. the September—October crop) was not taken at all at Kagachira last year, the seed from Babukhali (Jessore) being delivered at Kagachira after it had hatched. There is a most suitable plot of land adjoining the Araidanga school and post office, which has remained unoccupied for several years. The zamindar came to know how important I considered the site for a seed-rearing house, and he refused to part with it unless he got an exorbitant *salaami* and rent. Application was therefore made last April for the acquisition of this plot of land. As Government sanction has been obtained for acquiring this land, the seed-rearing house of Araidanga is likely to be built next September or October, which is the proper season for building mud houses in that locality. The Kagachira house will continue to be worked by Dandadhar's brother. This house has cost nothing to Government beyond the help rendered to Dandadhar in the shape of a microscope, an Eclair vaporiser, thread-nets, and other special appliances required for carrying on the new plan of work. The table given below will show how profitable the carrying on of this plan has proved to a village rearer:—

	April crop.	May crop.	July crop.	August crop.	September crop.	November crop.	January crop.	March crop.	Totals.
1	2	3	4	5	6	7	8	9	10
1. Kind of cocoons reared	Nistari	Nistari	Nistari	Nistari	Nistari	Nil	Nistari	Nistari	
2. Whence seed obtained	From previous crop.	From previous crop.	From previous crop	From previous crop.	From previous crop.	.....	From Berhampore office.	From previous crop.	
3. Quantity of seed used	1 kahan	3 khns.	2 khns.	2½ khns.	½ khn.	Nil	5 khns.	3 khns.	17 khns.
4. Quantity of outturn	77 kahans	312 ,,	155½ ,,	220 ,,	65 ,,	Nil	483 ,,	363 ,,	1675½ ,,
5. Quantity sold for seed	74 ,,	85 ,,	153 ,,	Nil	Nil	Nil	39½ ,,	3 ,,	354½ ,,
6. Percentage of pebrine	12 per cent.	9 per cent.	8½ per cent.	35 per cent.	18 per cent.	.....	Nil	½ per cent.	
7. Amount realised by sale of seed.	Rs. 148	Rs. 170	Rs. 306	Nil	Nil	Nil	Rs. 79	Rs. 6	Rs. 709
8. Amount realised by sale of cocoons.	Nil	,, 164	Nil	Rs. 175	Rs. 57	Nil	,, 384	,, 266	,, 1,046
9. Amount realised by sale of mulberry	Nil	Nil	Nil	Nil	Nil	Rs. 200	Nil	Nil	,, 200
10. Gross outturn ...	Rs. 148	Rs. 334	Rs. 306	Rs. 175	Rs. 57	,, 200	Rs. 463	Rs. 272	,, 1,955

3. Thus the gross receipts of Dandadhar Das during the year came to Rs. 1,955. This he got notwithstanding his disappointment in not being able to take the most important and profitable seed-crop of the year, viz., a crop of chhotopalu cocoons in October, for which he had leaf ready, but which he had to clear away in preparation for the November *bund*, when also he did not do any rearing, but sold his leaf instead. This is often done when there is the prospect of a good *bund* in the village. As there is no prospect

of selling November-*bund* chhotopalu cocoons for seed, Dandadhar did right in not doing rearing in November, but making a good profit by the sale of his mulberry.

4. No exact account is kept by Dandadhar of his expenses. He has five servants, and his brother and himself and a woman member of the family also work, and he hires extra labourers at the last stage of the worms when he takes a big crop. He has 37 bighas of agricultural land and 10 bighas of mulberry. The produce of the agricultural land keeps the five servants and also the 15 head of cattle he owns, and it also gives him all the *dál* (pulses) consumed in the family. He buys the rice consumed in his family and all other victuals except *dál*. He very rarely buys mulberry. The servants are employed chiefly in the agricultural land, their help for silk-rearing and mulberry cultivation being taken only occasionally. All this makes the calculation as to expense very difficult. Dandadhar calculates his expenses for silk-rearing at about Rs. 40 per month. His net income has been, therefore, about Rs. 125 per month. Three years ago he was struggling with his money-lenders like many other silk-rearers; now he is the recognised money-lender of his village and the most substantial cultivator in the neighbourhood.

Jot.

5. The success of Dandadhar Das of Kagachira made a great many cocoon-rearers anxious to learn the new methods and to possess themselves of microscopes. Bholanath Das of Jot was chosen as being the most substantial cocoon-rearer of Malda. All his four regular cocoon-crops taken by the working of the new methods proved perfectly successful. During two of the remaining four *bunds*, when the mulberry and the weather are both unsuitable for rearing silkworms, and when no one else in the village does any rearing, Bholanath attempted to rear seed-crops for the regular bunds. These were not very successful. It will take some time yet before Bholanath gets into the way of cultivating his mulberry in such a way as to get fresh leaf at all times of the year and of rearing silk-worms successfully under adverse climatic conditions. The four recognised *bunds* at Jot are the June, August, November, and March *bunds*. There is no demand for seed in the immediate neighbourhood of Jot at the end of these *bunds*, and although all his four crops were practically free from disease and fit for seed, it was only his first, *i.e.* the June crop, that happened to meet the eye of rearers from distant villages moving about in quest of good seed. As this nursery gets to be better known, a larger proportion of the crop is sure to be bought for seed by people from other parts of the country, and if Bholanath can arrange to rear during the odd *bunds* like Dandadhar has, his seed will be also taken in his own and the neighbouring villages. The following table gives a summary of the results obtained at Jot:—

	June crop.	July crop.	August crop.	September crop.	November crop.	March crop.	Totals.
1	2	3	4	5	6	7	8
1. Kind of cocoons reared.	Nistari	Nistari ...	Nistari ...	Chhotapalu ...	Chhotapalu ...	Nistari ...	
2. Whence seed obtained.	From Magura nursery.	From Kalimpong nursery.	From Duna nursery.	From Babukhali nursery.	From Batnagar nursery.	From Kagachira nursery.	
3. Quantity of seed used.	4¼ khns. ...	¼ khn. ...	6 khns. ...	¼ khn. ...	10¼ khns. ...	7 khns. ...	29¼ khns.
4. Quantity of outturn.	282 „ ...	30 „ ...	365 „ ...	25 „ ...	740 „ ...	540 „ ...	1,982 „
5. Quantity sold for seed.	82 „ ...	Nil ...	Nil ...	Nil ...	Nil ...	Nil ...	82 „
6. Percentage of pebrine.	4½ per cent. ...	2 per cent. ...	1½ per cent. ...	19 per cent. ...	5 per cent. ...	2 per cent. ...	
7. Amount realised by sale of seed.	Rs. 128 ...	Nil ...	Nil ...	Nil ...	Nil ...	Nil ...	Rs. 128
8. Amount realised by sale of cocoons.	„ 186 ...	Rs. 26 ...	Rs. 292 ...	Rs. 25 ...	Rs. 684 ...	Rs. 472 ...	„ 1,685
9. Amount realised by sale of mulberry.	„ 20 ...	Nil ...	Nil ...	Nil ...	Nil ...	Nil ...	„ 20
10. Gross outturn.	„ 334 ...	Rs. 26 ...	Rs. 292 ...	Rs. 25 ...	Rs. 684 ...	Rs. 472 ...	„ 1,533

6. Like Dandadhar, Bholanath owns 10 bighas of mulberry, but he produced nearly 300 khns. more of cocoons during the year by feeding the worms on purchased leaf. Dandadhar succeeding in disposing of more of his cocoons for seed, and buying very little mulberry realised a larger proportion of profit. Still Bholanath's profits came to nearly Rs. 800 during the 10 months when he worked on the experimental plan, as his expenses came to a little over Rs. 1,000 during the same period. Bholanath acknowledges never to have had such fortune in silk-rearing during his experience. Like Dandadhar's house at Kagachira, Bholanath's rearing house at Jot cannot be regarded as a seed-rearing house in the strictest sense. But like Dandadhar, Bholanath understands that he must remove to an isolated locality before he is established on a proper foundation. As soon as he can make suitable arrangements, he will remove to Arapur, where he has land adjoining the middle vernacular school of this village, where there are only two other cocoon-rearers, who are quite willing to work in unison with Bholanath. The ideal is always kept before the view of all the cocoon-rearers who are being helped to establish grainages. But as they are working of their own accord, they are allowed their own time to adopt all the new ideas into practice.

Mehedipur.

7. The success of Dandadhar and Bholanath prompted Naderchand Das, the head pundit of Arapur school (with whose aid Bholanath had at first expected to start the grainage at Arapur), to give up his

situation and go back to his own village (Mehedipur) to pursue the silk-rearing avocation of his family, Naderchand being a Punra or silk-rearer by caste. The drawback in his case was his poverty. Mr. W. G. Morey, Manager of Baragharia factory, generously made him a present of Rs. 50 to start him as a seed-rearer near his village. With Rs. 50 he was enabled to make only a poor shed, utterly unsuitable for rearing silk-worms successfully at all times of the year, especially during the odd *bunds*, which are so valuable for rearing seed, when the weather, however, is unsuitable for rearing worms. Extra good house accommodation is required to rear silk-worms successfully in those seasons when it is either too hot, or too cold, or too wet. I have, therefore, advised Naderchand to do the rearing in his family dwelling house in the village of Mehedipur at present, and when he has got sufficient funds by getting comparatively successful crops, to build a proper grainage at Beliadighi near Mehedipur, where he has already built a shed. Naderchand being a poor man could not stop long for instruction at Berhampore. I sent my assistant to help him in his first crop in August. This turned out very successful, and he succeeded in disposing of a portion of this for seed. He mismanaged his second, *i.e.* the November crop, when he was left to his own resources. Though belonging to the silk-rearing caste, he had scarcely any experience of the art, and he was deceived into buying leaf that had been submerged under water for a few days during October when the rains were very heavy. Professional rearers look upon such leaf as poisonous, and they call it *bishal* leaf, in consequence. It should, however, be also noted that about 60 houses in the immediate neighbourhood of Naderchand's house lost their crops entirely in November, and Naderchand's failure might partly have been caused by infection. I sent my assistant to help Naderchand in his third, *i.e.* the March crop also. This again proved a success, a portion of it being bought for seed. The details of the experiment at Mehedipur can be gathered from the following table:—

	August crop.	November crop.	March crop.	Totals.
1	2	3	4	5
1. Kind of cocoons reared.	Nistari ...	Chhotapalu ...	Nistari ...	
2. Whence seed obtained.	From Duna nursery.	From Batnagar nursery.	From Kagachira nursery.	
3. Quantity of seed used.	1¾ khns. ...	1¼ khns. ...	1 khn. ...	4 khns.
4. Quantity of outturn.	95 „ ...	10 „ ...	170 „ ...	275 „
5. Quantity sold for seed.	25 „ ...	Nil ...	10 „ ...	35 „
6. Percentage of pebrine.	1½ per cent. ...	6 per cent. ...	Nil ...	Nil.
7. Amount realised by sale of seed.	Rs. 50 ...	Nil ...	Rs 20 ...	Rs. 70
8. Amount realised by sale of cocoons.	„ 45 ...	Rs. 4 ...	„ 113 ...	„ 162
9. Amount realised by sale of mulberry.	Nil ...	„ 11-8 ...	Nil ...	„ 11-8
10. Gross outturn ...	Rs. 95 ...	„ 15-8 ...	„ 133 ...	„ 243-8

8. Naderchand owns only two bighas of mulberry, and he calculates his total expense in cultivating mulberry and rearing worms during the eight months when he worked on the experimental plan at a little over Rs. 100. Even with all his disadvantages, therefore, he did quite as well by silk-rearing as he had done as a school-master getting Rs. 18 a month. He feels confident he will get on much better in future.

9. The seed-rearing house of Duna may be also regarded as an offshoot of the Kagachira rearing-house, though the former is situated in Birbhum and the latter in Malda. Cocoon-rearers of one district often go in search of good seed to another district. Mr. C. W. Marshall, now Manager of the Bengal Silk Company, takes over some silk-worm eggs from me almost every *bund* for distribution or sale among villagers. He used to do the same when he was Manager of the Ganutia factory in Birbhum. His persistent efforts in this direction have resulted in the cocoon-rearers of Duna and other villages near Ganutia looking upon the experimental seed with confidence. Last May, Banamali Mandal and a few other Duna rearers came to Dandadhar's house to buy seed. Here they saw me and begged me to help them as I had helped Dandadhar in establishing a seed-rearing house at Duna. Banamali then placed himself under instruction at Berhampore,

Duna.

and I sent my assistant to him to help him in his first experimental crop in July. This crop turned out to be a perfect success, most of it being sold for seed. He realised a net profit of about Rs. 200 from this one crop, which enabled him to pay off all his debts, which had been accumulating on him for a number of years. His second, that is the September crop (which cannot be regarded as an experimental crop in any sense), was a total failure. It came about in this way. Instead of buying the experimental chhotopalu seed from Babukhali at Rs. 2 a *kahan*, he bought some village chhotopalu cocoons for Re. 1 a *kahan*. On examining the moths he found every one of them pebrinised; but instead of throwing away the seed and missing a crop, he kept it on, and his confidence in the microscopic test was for a time shaken, as the worms spinning the cocoons he had procured had ripened without a flaw. While rearing from this seed, he sent me a false report that he had rejected all the pebrinised layings, that is only 25 per cent. of the total number, and he sent me no moths for re-examination. When he lost his crop, he wrote again to inform what had actually taken place. His third crop for which he used experimental seed, was a perfect success. His fourth, that is, the March crop of barapalus and a few chhotopalus, could not be properly regarded as an experimental crop, as the barapalu seed was not microscopically selected, and as the chhotopalus were reared in the same room as the barapalus. The barapalu being an annual silk-worm, the eggs used by Banamali were laid in March 1894, when he had no occasion to make a microscopic selection of the seed. The details of the experiment conducted at Duna are given in the following table:—

	July crop.	September crop.	November crop.	March crop.	Totals.
1	2	3	4	5	6
1. Kind of cocoons reared	Nistari ...	Chhotopalu	Chhotapalu	(1) Barapalu. (2) Chhotopalu.	
2. Whence seed obtained	Village seed	Village seed	From Batnagar nursery.	(1) Previous crop. (2) Ditto.	
3. Quantity of seed used ...	2 khns. ...	2 khns. ...	2 khns. ...	(1) ½ khn. ... (2) ½ „ ...	6½ khns.
4. Do. of outturn ...	190 „ ...	Nil ...	130 „ ...	(1) 17 khns. ... (2) 28 „ ...	365 „
5. Do. sold for seed	105 „ ...	Nil ...	Nil ...	Nil ...	105 „
6. Percentage of pebrine ...	6½ per cent.	100 per cent.	8 per cent. ...	(1) Unexamined. (2) 33 per cent.	
7. Amount realised by sale of seed	Rs. 210 ...	Nil ...	Nil ...	Nil ...	Rs. 210
8. Amount realised by sale of cocoons	„ 58 ...	Nil ...	Rs. 91 ...	(1) Rs. 13 ... (2) Rs. 18 ...	„ 180
9. Amount realised by sale of mulberry	Nil	Nil ...	Nil ...	Nil	
10. Gross outturn	Rs. 268 ...	Nil ...	Rs. 91 ...	Rs. 31 ...	„ 390

10. Banamali is a poor cultivator who keeps no servants, but does all the cultivation and rearing himself with the help of his family. He owns only two bighas of mulberry, and his outgoings during the nine months when he worked on the experimental plan were only about Rs. 90. He has thus found the work thoroughly remunerative.

11. The Batnagar nursery is an offshot of the Duna nursery. The founder of this nursery is Kalidas Ghose, head pundit of Lokpara school near Duna and Ganutia, but a silk-rearer by caste. His family like other Batnagar families had given up cocoon-rearing as an unprofitable industry, but he still owned two bighas of mulberry. There being no silk-rearing done at present at Batnagar, and Kalidas Babu being connected with a school attended largely by children of cocoon-rearers, his application for help was readily complied with. He came for instructions to Berhampore, and

Batnagar.

took back all the special appliances and examined "seed." His first, *i.e.* the September crop of chhotopalus, was entirely sold for seed. His second, *i.e.* the November crop, was also perfectly successful, but there is never any demand for November chhotopalus for seed. Elated with success, he went in for rearing a much larger quantity of worms than he had leaf for, and failing to obtain leaf anywhere within 8 miles of Batnagar, his third, *i.e.* the January crop, was all but a total failure. His fourth, that is the March crop, was perfectly successful, a portion of the crop being bought for seed by rearers from neighbouring villages. The details of the result obtained at Batnagar are given in the following table: —

	September crop.	November crop.	January crop.	March crop.	Totals.
1	2	3	4	5	6
1. Kind of cocoons reared	Chhotapalu	Chhotopalu	Nistari ...	Nistari.	
2. Whence seed obtained	From Berhampore office.	From previous crop.	From Pokhuria nursery.	From Kagachira.	
3. Quantity of seed used...	¾ khn. ...	½ khn. ...	1 khn. ...	¾ khn. ...	3 khns.
4. Do. of outturn ...	62 khns. ...	40 khns. ...	21 khns. ...	107 khns. ...	230 ,,
5. Do. sold for seed ...	62 ,, ...	Nil ...	Nil ...	40 ,, ...	102 ,,
6. Percentage of pebrine ...	½ per cent.	2 per cent.	Nil ...	Nil	
7. Amount realised by sale of seed	Rs. 124 ...	Nil ...	Nil ...	Rs. 40 ...	Rs. 164
8. Amount realised by sale of cocoons	Nil ...	Rs. 32 ...	Rs. 10-8 ...	,, 33-8 ...	,, 76
9. Amount realised by sale of mulberry	Nil ...	,, 8 ...	Nil ...	Nil ...	,, 8
10. Gross outturn	Rs. 124 ...	,, 40 ...	Rs. 10-8 ...	Rs. 73-8 ...	,, 248

12. Like the other men, Kalidas can give no exact information about his expenses, except that he spent Rs. 10, Rs. 15, and Rs. 52, respectively, for buying leaf from outside for his September, January, and March crops. He has three servants, but very little of their time is taken up for silk-rearing and mulberry cultivation, and the silk-rearing did not interfere with his regular attendance at school, the midday cleaning and feeding being done by the members of his family. Kalidas thinks his actual outgoings for silk-rearing and mulberry cultivation, inclusive of the purchase of extra leaf, came to less than Rs. 100 during the seven months when he worked on the experimental plan, and that he made a clear profit of about Rs. 150 during this time.

Satpalsahat.

13. Babu Dinabandhu Sinha, a medical practitioner of Satpalsahat, another village in Birbhum, close to Ganutia, has been most persistent in his application for a microscope and other special sericultural appliances. He is not a cocoon-rearer by profession, and my experience has been that cocoon-rearing done by hired labour under unprofessional management is usually mismanaged. I have given him no encouragement beyond letting him have some barapalu eggs last October and buying up the resulting seed (26 ounces) for Rs. 21. He obtained a crop of 12 kahans of very fine barapalu cocoons last November, and he exposed the spinning screens in the *hát*, an important one in Birbhum, which excited considerable amazement in the neighbourhood. The mulberry leaf obtained in November produces better barapalu cocoons than that obtained in February and March, when barapalus are still reared in a few villages in Birbhum and Murshidabad. Barapalu cocoons are very much superior to the ordinary Bengal cocoons, but being annuals are neglected. By untimely hibernation or by treating newly-laid eggs with hydro-chloric acid, it is possible to take as many crops of barapalu during the year as of nistari or chhotapalu. The experiment has been carried on on a small scale at Berhampore at all times of the year, but until last October no one could be induced to give effect to the experiment on a practical scale in a silk-rearing village. The

barapalu eggs sent to Dinabandhu Babu were hibernated at Darjeeling in July, August, and September. The demonstration at Satpalsahat may lead to important results.

Sainthia.

14. Babu Bepinbehary Banerji, a railway contractor of Sainthia (Birbhum), has been also anxious to start a grainage, if he is helped like the five Malda and Birbhum rearers. Not being a professional silk-rearer I have not given him any encouragement beyond letting him have some castor-oil plant-feeding silkworms, which are more easily reared than mulberry silkworms, and which are very useful therefore for learning silk-rearing. Sainthia is a most suitable place for a grainage. Indeed, none of the villages where grainages have been established are conveniently situated for silk-rearers. They have been chosen simply because professional cocoon-rearers happened to come from these villages and presented themselves for instruction. The places best suited for *grainages* are those through which cocoon-rearers constantly pass in search of good seed, and yet where no silk-rearing is done. Sainthia, Rampurhat, Tinpahar, Rajmahal, Rampur Boalia and Kandi are places answering to these requirements.

15. There are several other applications for help in the matter of microscopes, &c., from cocoon-rearers of Malda and Birbhum, but these require no special mention, as it is not intended to establish any more grainages in these two districts during the present financial year, when it has been decided to demonstrate the value of scientific methods in some other silk districts.

The out-stations.

16. The seed-rearing houses founded on amateur effort outside the silk districts have not as yet become self-supporting. They all labour under certain common disadvantages: (1) They are all worked directly by hired servants receiving monthly wages, all of whom work more or less like hirelings. The gentlemen who have instituted these experiments have not the time to keep constant watch over the work of the trained men. (2) They are wholly dependent on me for the disposal of their crops, and I have not had funds to buy up what they have produced hitherto. (3) Since professional cocoon-rearers have begun to come for help, it has been thought advisable to render them as much help as possible even at the risk of making the out-stations less effective. (4) It has not been found quite convenient to carry out the programme of experiments as laid down in Government letter No. 294Agri., dated the 31st July 1891. It would have been easy to carry out this programme if the scheme for the disposal of seed, recommended in paragraph 2 (*b*) of the same Government letter, had been carried out by the silk factors, at whose instance and in whose interest the experiments have been carried on. Appeal has always been made for help in the distribution of seed to all the principal silk factors, but the response has been very meagre; while the appeal to zamindars and managers of estates has never met with any response at all. If there was no difficulty in the matter of distribution of seed, there would have been no difficulty either in raising a large crop of nistari cocoons in May and June at Kalimpong, of chhotapalu cocoons in September and October at Pukhuria, and of nistari and chhotapalu cocoons at Khulna, Babukhali or Magura in January, the three crops being sent to silk factors or others for distribution or sale as seed for the three regular *bunds* of the year, the July, November, and March *bunds*. Unless the distribution is made at once the seed is wasted, as it takes only eight to ten days to hatch.

17. On the other hand, it is not to be inferred that the plan of raising seed at Kalimpong, Pakhuria, and Khulna is not a sound one. It is the ideal plan, though it has been found difficult to carry out the ideal with the resources at my command. With reference to the experiments conducted at Kalimpong, Pukhuria, and Khulna, the following points may be noted:—(1) It was the use of the seed raised in these stations that inspired confidence in the minds of the Malda and Birbhum rearers. Although the rearing-house at Kagachira has been a striking object-lesson, the ground had been already prepared for a favourable reception of the experimental methods by professional cocoon-rearers (2) Theoretically, the outstations are better suited for rearing healthy seed than any village situated in the silk districts. There is an optimum temperature and other atmospheric conditions suitable for rearing silkworms with perfect success. These prevail only in the November *bund* in the silk districts of Bengal. It was the November *bund* conditions that were sought and obtained in May and June at Kalimpong, in September and October at Pukhuria, and in January at Khulna. (3) It was the experiments conducted under different climatic and other conditions in the outstations that enabled me to carry on experiments of various kinds, and to arrive at definite conclusions not only with reference to silkworm diseases, but also on such questions as the possibility of rearing the barapalu silkworms at all times of the year, of introducing European cocoons into Bengal, of the value of large mulberry trees, &c.

Magura.

18. The silk experiments were commenced at Babukhali in the Magura subdivision of Jessore by Babu Peary Mohan Guha, a pleader of the Jessore Bar. Peary Babu himself seldom visits Babukhali, and the man he got trained for the silk work simply wasted his money. Some excellent seed crops were taken at Babukhali during the last three years when my assistant or myself was present at Babukhali, but Peary Babu's man did next to nothing in our absence. The microscope lent to Peary Babu was therefore taken back early during the year, and made over to Babu Jnanananda Chakravati who had made a mulberry plantation and a rearing house at Magura. Peary Babu's man continued to rear chhotopalu worms at Babukhali, and some seed was bought from him by Malda and Birbhum rearers. Though microscopic selection had been dropped at Babukhali this seed proved much better than any village chhotapalu seed that

was examined. The details of the rearing done at Babukhali during the year could not be obtained. The following table gives the information concerning the experiment at Magura:—

	April crop.	May crop.	August crop.	January crop.	March crop.	Totals.
1	2	3	4	5	6	7
1. Kind of cocoons reared ...	Nistari ...	Nistari ...	Nistari ...	Nistari ...	Nistrai.	
2. Whence seed was obtained ...	From previous Magura crop.	From previous Magura crop.	From previous Magura crop.	From Berhampore office.	From previous Magura crop.	
3. Quantity of seed used	150 layings ...	50 layings ...	100 layings ...	100 layings ...	26 layings ...	426 layings or about ¾ khn.
4. Quantity of outturn	22 khns. ...	4¼ khns. ...	9½ khns. ...	18¾ khns ...	3¾ khns ...	58 khns.
5. Percentage of pebrine	2 per cent. ...	4 per cent ...	10 per cent. ...	None ...	None.	
6. Quantity disposed of for seed	22 khns ...	4¼ khns ...	1¼ khns ...	18 khns ...	2 khns ...	48¼ khns.
7. Amount realisd by sale of seed	Rs. 44	Rs. 9-5 ...	Rs. 3-6 ...	Rs. 36	Rs. 4	Rs. 96-11.
8. Amount realised by sale of cocoons.	.....	.....	.....	.....	.....	,, 12.
9. Gross outturn	.....	.....	.....	.....	.....	,, 108-11.

19. Jnanananda Babu estimates his total expense in keeping up two bighas of mulberry and two trained servants at Rs. 300. He incurred a net loss of about Rs. 200 during the year. It may be mentioned here that at Khulna, Babukhali, and Magura, there will be several hundreds of mulberry trees ready for rearing silkworms two or three years hence, these being two to three years old now. Trees cost nothing in keeping up, and these may allow silk-rearing to be carried on at a profit even by amateurs, as the expense in silk-rearing in Bengal consists mainly in keeping up the dwarf mulberry.

Pukhuria.

20. The Revd. A. Campbell, of Pukhuria in Manbhum, who has been conducting silk experiments for more than seven years, has not been able as yet to make these self-supporting, though they are in a much more advanced condition than in any other out-station. He has introduced not only mulberry silk-rearing, but also the rearing of Endi cocoons, and reeling and spinning of silk and weaving of silk cloth among Sonthal boys and girls. Mr. Campbell's aim is not to make the experiments pay, but to introduce the industry in all its departments among the Sonthals, and he spares no trouble or expense to carry out his aim. Mr. Campbell's attempts in the direction of tussur silk reeling are of special value. If he can introduce tussur reeling among the Sonthals, who now produce only the cocoons which mostly find their way to the Murshidabad silk factories, he will have achieved an important success. During the year under report Mr. Campbell took only one large crop of mulberry cocoons. He used 2¾ kahans of seed and obtained 235 kahans of cocoons. I examined several hundred moths out of his crop, but failed to discover a single specimen of pebrine. I was diffident, however, about buying up the whole of his crop for Rs. 470, that is, at Rs. 2 a kahan, as I was doubtful about getting men ready to buy up so much seed as soon as it arrived by post. I bought, therefore, only Rs. 28 worth, which I resold to villagers at the same price. Mr. Campbell had thus over 200 kahans for his boys to learn reeling with.

Kalimpong.

21. The experiment at Kalimpong, which also depends on my being able to buy up the crops raised, could not be carried on with any more vigour during the year under report than in the previous year. The reason will be apparent from the following extract from the Revd. J. A. Graham's letter dated the 14th March 1894, that is, immediately before the season's work was taken in hand:— "We must have a regular programme for the disposal of silk before we can expect any general results in the district. Will you buy up all the seed of this year's crop? At what rate? Uncertainty on this score keeps back the people." I could give Mr. Graham no assurance on this point in 1893-94, nor during 1894-95. In 1893-94 I got my estimate sanctioned as late as the end of January 1894, and for last year only a partial sanction of my estimate came as late as February 1895. As there was a trained man employed at Kalimpong to maintain the mulberry nursery and to do the rearing of silk-worms, a little rearing was done and the seed produced bought up. The difficulty about disposing of the seed raised at Kalimpong is particularly great, as Kalimpong has been found well suited for rearing high class cocoons such as the barapalu and the European cocoons. The eggs of these are not in demand at all in Lower Bengal. The European eggs were sent to two rearers in the Punjab who paid for the seed. They have got excellent result. No one, not even the experimental rearers, would take the barapalu seed, not at least in November, when the experiment would prove specially valuable. The eggs were sent to all the rearers of Malda and Birbhum following the experimental plan of work last October, and also to Babu Dinabandhu Sinha of Satpalsahat (Birbhum). It was the last-mentioned person who alone took the trouble to rear the worms, and he got excellent result. Besides the 40 ounces of annual seed raised at Kalimpong, there were 50 ounces of nistari and chhotapalu (obtained from 19 kahans) seed raised in this station which was bought up by Mehedipur (Malda) rearers. These also gave excellent results. Mr. Graham having gone home on furlough, it will not be probably feasible for the Scotch Mission to carry on silk experiments at Kalimpong, but correspondence on the subject is still proceeding.

22. The pay of the two trained men employed at Pukhuria and Kalimpong at the rate of Rs. 8 a month was defrayed out of the funds for the silk experiments. A portion of the crop raised in these stations was also bought up with Government money. No help was rendered to the other outstations beyond buying up of the seed raised in them which was resold at the purchase price.

23. Rearing was carried on at Berhampore only for strictly experimental purposes, as there was no longer any occasion to rear a large quantity of silkworms for producing healthy seed only. Though the sale of healthy seed has steadily increased during the last four years, a great deal more of cocoons fit for seed has been raised than it has been found possible to dispose of. In the case of professional silk-rearers this does not matter, as they get only a less proportion of profit for cocoons that are not disposed of for seed. In the case of the outstations and the central experimental station at Berhampore, it is different. In these stations the work is carried on by the employment of hired labour, and unless the crops are wholly diposed of for seed, there is loss incurred. It has been found necessary therefore to restrict the rearings at Berhampore and the outstations, while encouraging the professional cocoon-rearers, who can work at a profit whether they dispose of their crops for seed or for silk, to rear as much as they can. It was in connection with special experiments that rearing was done of only a few thousands of silkworms at a time at Berhampore. The total quantity of mulberry silk cocoons reared at Berhampore during the year was 35 kahans, of which only 13 kahans were sold for seed. The total quantity of white Endi (Attacus Ricini) cocoons reared at Berhampore was 6 kahans. At the request of the Indian Industrial Association these cocoons have been sent free of charge to about 40 persons in different parts of India. One kahan of these cocoons has been also made over to Mr. Otto Anz, who is working his new process of reeling silk at Berhampore. The cocoons reared at Berhampore that are not sold for seed are utilised for teaching reeling and spinning to unprofessional apprentices. There have been practically no diseases among the silkworm reared at Berhampore. Of 476 chhotopalu moths out of Berhampore cocoons reared last August, only two pebrinised specimens were found, and none at all in the nistari, barapalu and European moths, nor in the Endi silk-moths, reared at Berhampore at other times. As professional rearers do not like rearing chhotapalu worms in the hot months and nistari worms from September to December, a few of these ordinary Bengal silkworms were reared in the Berhampore office to keep up the seed during these months. European worms were reared in February and March only, and a few layings of barapalu eggs hatched artificially with hydrochloric acid are reared at Berhampore time after time, in case the rearing should attract the interest of the cultivators. The important results obtained last year in connection with the special experiments conducted at Berhampore were the following :—

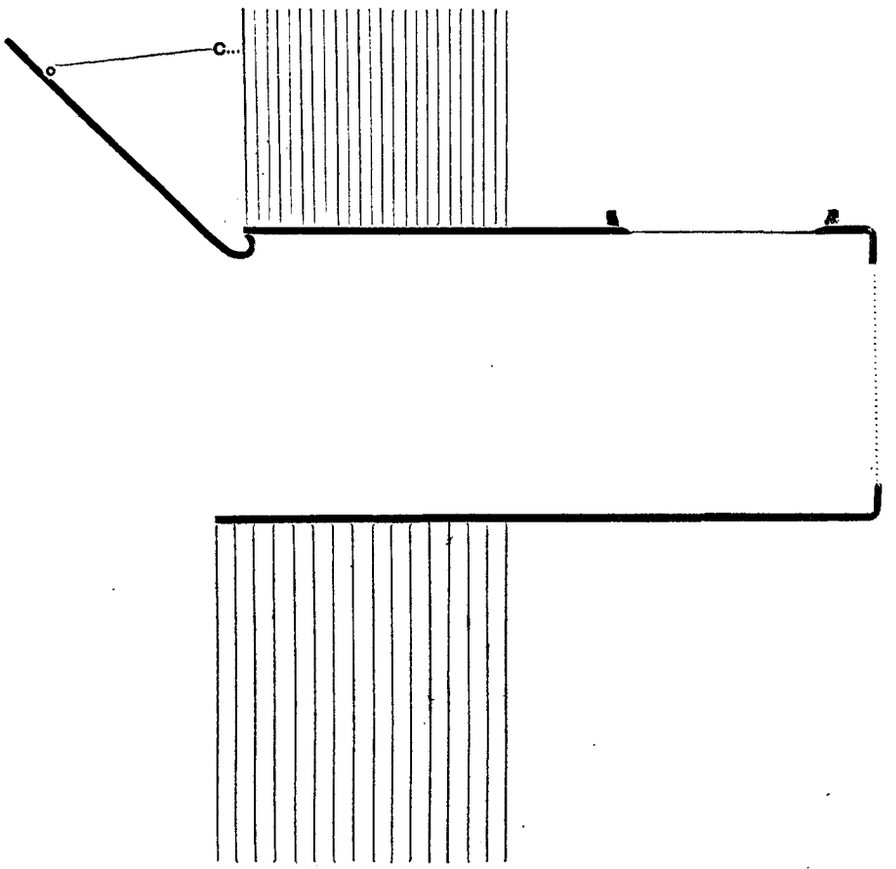
Berhampore.

(1) The use of carbon-bisulphide for killing cocoons raised for seed.
(2) The invention of a fly-trap.

24. A good opportunity presented itself last June for demonstrating the value of the first experiment on a large scale to the cocoon-rearers in one of their own villages. Three hundred and twelve kahans of excellent seed cocoons were obtained by Dandadhar Das of Kagachira at the end of last May. There had not been rain for a long time, and the mulberry was backward. Villagers were anxious to buy Dandadhar's seed, but they would not buy until it rained. I advised Dandadhar to keep his cocoons unkilled to the last day to give the cocoons the best chance of being taken up for seed. I told him I would take the responsibility of killing the cocoons on the eve of the moths cutting out and spoiling the cocoons. Some rain fell on the last day, and he sold 85 kahans of his cocoons for seed, 227 kahans being killed at night with 1lb of carbon bisulphide. If this had not been done, about Rs. 200 worth of cocoons would have been spoilt. This method of killing cocoons should, in fact, be ordinarily practised in grainages to give the cocoons the best chance of being bought up for seed.

25. The invention of a fly-trap for killing the tachinid parasites that are so destructive to silkworms has been attended with still more beneficial results. The trouble caused by these flies in the odd *bunds*, which are specially valuable for rearing seed-crops, had been the chief obstacle in rearing healthy seed in the silk districts; the invention of the trap now doing away with this obstacle altogether. The fly-trap is at once a ventilator and a device for killing flies. It serves, therefore, to meet two most important desiderata in the cocoon-rearing industry of Bengal. Want of proper ventilation of silk-rearing houses has had as much to do with failures of cocoon crops as the fly parasites. A simple device which combines the advantages of a ventilator and a fly-killer is, therefore, an important addition to silk-rearing appliances. The fly-trap is made out of empty packing cases. A portion of the top of a case ($9'' \times 6''$) is sawn out, and in this space is put in a glass pane, which is fixed in position with deep battens and putty-paste. An opening is also sawn out at one end of the box and to this space is pinned on a piece of galvanised wire netting of meshes small enough to exclude the parasites. A lid is hinged on to the other end of the box. The trap is embedded in a wall of the rearing room, about eight feet from the ground, that is, at the height at which the parasites usually fly about. This height is also sufficient for the purpose of ventilation, as the topmost tray of silkworms is not placed at any higher level. When fixing the trap into a wall, the lid-end is placed inside the rearing-room, and the end to which the wire gauze is attached is placed protruding outside the rearing-house. The glazed portion of the top of the box also remains outside looking upwards. The lid or shutter at the inner end is ordinarily kept raised. It is dropped when the rearing-room requires to be disinfected with sulphur fumes. The trap facing the prevailing wind is kept closed, as direct access of wind into a rearing-room is found injurious to silkworms. The trap is fixed as far away from the door of the rearing-house as possible, the object being to attract the parasites to the trap and repel them from the entrance to the rearing-room. To effect repulsion from the entrance, a piece of cowdung cake is kept ignited and smoking in front of the entrance, when the midday cleaning and feeding are done. The parasites never attempt to enter the rearing-room before sunrise or after sunset,

when the morning and night feedings are done. A little clean water is put on the glazed portion of the trap from outside the rearing-room, a few drops of kerosine being added to it. The wooden portion of the trap protruding outside is also smeared with a stick-fast which remains sticky for 20 to 25 days, that is, through the whole rearing period. This stick-fast is made by boiling together colza oil and resin, a few drops of akanda (colotropis gigantia), milk being afterwards added. It is the stick-fast which is commonly used in the silk districts for keeping out ants from the rearing stands. Light and smell both attract crowds of the parasitic flies round these traps outside the rearing-room. In their mad attempt to effect an entrance into the rearing-room, they are found dashing against the glass portion of the trap chiefly, also against the sides. Here they perish, coming in contact with the minutest particle of kerosine-water, or entangled in the stick-fast rubbed all over the wooden portion of the trap. The simplicity of the device will be apparent from the diagram given below.



Summary of results.

26. The total quantities of seed-cocoons raised and distributed in the different stations can be gathered from the following table:—

Name of Station.	Seed-cocoons produced (in kahans).	Seed-cocoons sold (in kahans).	Equivalent in ounces of the eggs sold.
1	2	3	4
	Khns.	Khns.	Ounces.
1. Kagachira ...	1,675⅓	354⅓	1,063
2. Jot	1,982	82	246
3. Mehedipur ...	275	35	105
4. Duna	365	105	315
5. Batnagar ...	230	102	306
6. Satpalsahat ...	12	8	26
7. Babukhali ...	20(?)	3½	10
8. Magura ...	58	48½	145
9. Kalimpang ...	33	33	90
10. Pakhuria ...	235	14	42
11. Berhampore ...	35	13	40
Total ...	4,920⅓	798⅓	2,388

27. The following table gives an idea of the progress of the experiment during the last four years:—

Year.	Total expenditure, including my salary and travelling expenses.	Government money spent in raising "seed."	Receipts against this expenditure.	Total quantity of seed sold.
1	2	3	4	5
	Rs. A. P.	Rs. A. P.	Rs. A. P.	Ounces.
1891-92	8,077 1 9	743 10 0	484 5 0	1,035
1892-93	8,134 2 0	513 3 3	974 9 0	1,900
1893-94	7,955 3 0	251 15 6	312 6 0	2,134
1894-95	8,259 0 6	244 3 9	208 3 6	2,388

28. The above table would clearly point to the fact that, though the experiments have made steady progress during the last four years, the progress has been rather slow. The nature of the correspondence with Government for upwards of two years, and the difficulty experienced during the last two years in obtaining Government sanction to my estimates, made it quite apparent that Government was entertaining serious doubts about the value of the silk experiments. Such doubts were probably raised by strange assertions in the press. Though I was careful to reply to every public criticism which was not of a mere personal character, the assertions themselves were of a sufficiently startling character to make the Government diffident about continuing the experiments any longer. Such diffidence and doubts have had a paralysing influence over the experiments for the last two years, when a great deal more might have been done to popularise the experimental seed and the experimental methods of work among cocoon-rearers. The assertions that have been made from time to time in the press may be summed up under the following seven heads:—

(1) There is no pebrine in Bengal.
(2) Flacherie does the most harm to Bengal silkworms, and my experiments were concerned only with pebrine.
(3) Arsenic has been discovered by the Chinese as a remedy against pebrine.
(4) The microscope is not necessary for distinguishing pebrine, three simple methods being successively claimed as being as unerring as the microscope, if not more so, in the detection of pebrine.
(5) What I have called pebrine corpuscles are really pigment cells necessary for the health of silkworms.
(6) My experiments have had ups and downs, while under a proper system of selection the quality of cocoons should have gone on steadily improving.
(7) Silkworms, fed almost hourly day and night, throw off diseases and produce healthy seed, proper regard being had to cleanliness and ventilation at the same time.

29. It is not necessary to deal with all the above seven points in this report, but only with the last two which have claimed your attention during the past year. The question of the quality of cocoons in relation to their freedom or otherwise from disease was gone into so thoroughly during the first two years of the experiments that I can but repeat the inferences then arrived at with renewed confidence. These will be found in my letter No. 255, dated the 20th February 1888, especially in the column of remarks in Table A. The table given below will show that these inferences are not based on a hasty generalisation, that is, examination of only half a dozen samples of cocoons. Besides, as stated in my letter just referred to, these inferences are in exact correspondence with the prevailing opinion of cocoon-rearers all over Bengal, who actually object to cocoons of extra good quality for seed purpose. A remarkable example of this kind came to my notice last November. Satkari Mandal of Uttarpara (opposite Berhampore) got a most remarkably healthy crop of chhotapalu cocoons from the Pukhuria seed. A number of rearers from Rajshahi were eager to buy the cocoons for seed, when the cocoons were not yet formed. They waited until the cocoons were formed, but when they were formed they objected to them on their being too large to produce healthy seed. This notion need not be regarded as a mere prejudice. It is as much in accord with scientific facts, as a great many notions recognised in European agriculture; *e.g.*, medium sized swedes, turnips, mangolds, and potatoes proving healthier for seed purposes than large sized "roots;" breeds of cattle too rich in milk not being healthy, &c. The rationale of these notions is not far to seek. Silk, like starch or milk, is secreted, or, more strictly speaking, *excreted* as a bye-product, and it is not necessary for the life of the insect. Chhotapalu cocoons, though containing a larger proportion of silk than Nistari, are naturally more prone to diseases. Semi-domesticated Eria silkworms, which are remarkably healthy in other respects, show the abnormality known as 'Court' to an exaggerated degree. I am not pleading these arguments as an excuse for producing poor cocoons; for, as a matter of fact, my cocoons have been always of excellent quality. In fact, I made the statement quoted below long before any question was raised on this point:—"The quality and weight of cocoons are no guarantee against disease. This the village rearers understand well, and often they would choose for seed cocoons which would be rejected at least in European filatures,

and pay more money for them. When pebrine manifests itself by external signs, the rearers know it and avoid it, although the worms may produce first-class cocoons for filature use" (Table A appended to my No. 255, dated the 20th February 1888). The figures given in the following table, culled chiefly from my first year's reports, are more convincing than arguments:—

Cocoons of which *bund*.	What class of cocoons.	Percentage of pebrine in moths.	Number of pierced cocoons in 1 tola.	Number of cocoon shells divested of chrysalids and their castings in 1 tola.
1	2	3	4	5
May *bund*, 1887 ...	Madrasi	½ per cent. ...	Although the roughest and readiest method of judging the quality of a class of cocoons is to weigh the pierced cocoons with castings of ecdyses, the method is not accurate. So the pierced cocoons were cut open, the castings rejected and the pure "coques soyeux" weighed. It is these weights that have been entered in column V. For comparison a few corresponding figures have been entered down below in this column.	133
Ditto ...	Do.	24 „ ...		135
Ditto ...	Do.	20 „ ...		140
Ditto ...	Do.	Nil ...		140
Ditto ...	Do.	100 per cent. ...		144
Ditto ...	Do.	75 „ ...		152
Ditto ...	Do.	67 „ ...		160
Ditto ...	Do.	33 „ ...		168
Ditto ...	Do.	80 „ ...		168
Ditto ..	Do.	100 „ ...		172
Ditto ...	Do.	33 „ ...		180
Ditto ...	Nari	Nil ...		144
July *bund*, 1887 ...	Madrasi	4 per cent. ...		124
Ditto ...	Do.	60 „ ...		124
Ditto ...	Do.	20 „ ...		124
Ditto ...	Do.	33 „ ...		124
Ditto ...	Do.	Nil ...		128
Ditto ...	Deshi	96 per cent. ...		129
Ditto ...	Do.	88 „ ...		144
August *bund*, 1887 ...	Do.	14 „ ...		98
Ditto ...	Madrasi	4 „ ...		112
Ditto ...	Do.	84 „ ...		120
Ditto ...	Do.	62 „ ...		120
Ditto ...	Do.	Nil ...		124
Ditto ...	Do.	„ ...		124
Ditto ...	Do.	„ ...		128
Ditto ...	Do.	23 per cent. ...		128
Ditto ...	Do	32 „ ...		132
Ditto ...	Do.	100 „ ...		136
Ditto ...	Do.	63 „ ...		136
Ditto ...	Do.	94 „ ...		140
Ditto ...	Do.	45 „ ...		140
Ditto ...	Do.	66 „ ...		144
Ditto ...	Do.	100 „ ...		160
Ditto ...	Do.	100 „ ...		168
September *bund*, 1887	Deshi	53 „ ...		144
Ditto ...	Madrasi	5 „ ...		110
Ditto ...	Do.	20 „ ...		120
Ditto ...	Do.	66 „ ...		160
November *bund*, 1887	Deshi	42 „ ...		129
Ditto ...	Dhali	20 „ ...		120
Ditto ...	Nari	Nil ...		116
Ditto ...	Madrasi	„ ...		120
Ditto ...	Do.	„ ...		116
January *bund*, 1888 ..	Do.	20 per cent. ...		128
Ditto ...	Do.	86 „ ...		170
Ditto ...	Do.	28 „ ...		172
Ditto ...	Do.	14 „ ...		180
Ditto ...	Do.	11 „ ...		190
January *bund*, 1895...	Do.	Nil ...		140
Ditto ...	Do.	„ ...		136
March *bund*, 1895 ...	Deshi	70 per cent. ...	136	144
Ditto ...	Madrasi	Nil ...	112	150
Ditto ...	Do.	„ ...	102	142
Ditto ...	Do.	„ ...	100	124
Ditto ...	Do.	„ ...	144	192
Ditto ...	Do.	„ ...	98	140
Ditto ...	Do.	„ ...	78	132

30. The subject of feeding silkworms day and night at an interval of every one or two hours has been dealt with in my letter No. 30, dated the 12th May 1893, and also in my letter No. 123, dated the 31st December 1894. As you are fairly satisfied that the position I maintain is sound, it is not necessary that I should deal with it at length in this report.

31. The drawing up of a Bengali text-book on sericulture was the principal work of the year. An English translation of this book was also submitted under your orders. The matter was urged constantly by those rearers (chiefly of Malda) who have been deriving benefit by the use of the experimental seed and who have appreciated the new methods of work introduced in their midst. So eager were they about learning the methods that several of

their number transcribed for their own use the whole of Part II of my manuscript, viz. the part dealing with silkworm diseases. The want of a text-book was also felt in carrying on the experiments in the outstations. The matter was, therefore, submitted for your consideration in July 1893 (No. 59, dated the 3rd July 1893). In April 1894, two microscopes having arrived from England, Mr. J. A. Anderson, of Calcutta, having kindly lent another, and the one which had been in use at Khulna being withdrawn, a large number of villagers were given systematic training. By July 1894 so many requests had been received from cocoon-rearers for the publication of the book that I put my manuscript in press without waiting for your final orders on the subject. The results of the experiments cannot be made widely known among cocoon-rearers except by a systematic scheme of technical education imparted through village schools. If sericulture is recognised as one of the subjects for examination in village schools, it will be taken up at present only in about half a dozen schools, near which *grainages* have been established. As boys pass out of these schools and carry the knowledge to other villages as *pundits* and silk-rearers, the subject will be naturally taken up in other schools also. To help this scheme forward, a microscope and an Eclair vaporiser (for disinfecting rearing appliances and the rearing-house and its surroundings) may be given away as prizes every year to the boy who acquits himself best in this subject in the middle vernacular examination. I may be permitted to mention here that this seems to be the general feeling among silk factors and cocoon-rearers, as may be inferred from the two memorials signed by European silk factors and cocoon-rearers submitted to the Director of Public Instruction. One of these which was handed over to me I submitted through you with my No. 44, dated the 16th June last. The other memorial was presented, I understand, to the Chairman of the District Board of Birbhum.

32. The microscopic work of all the stations was checked by me at Berhampore, samples of cocoons or of moths being sent from all the stations from each crop. The work of Babu Jnanananda Chakravarti, of Magura, of Ason Lepcha, of Kalimpong, and of Banamali Mandal, of Duna, was usually found to be carelessly done. Dandadhar Das, of Kagachira, neglected this work in July on account of his wife's death. The work done by the other men was found very correct.

33. Mulberry plants, cuttings and seed were distributed to the following parties during the year:—The Burdwan Raj Estate; Munshi Shafacutullah, of Kuch Bihar; Babu Kalinath Mukerjee, of Jessore; Babu Chunilal Mukerjee, of Khamargachi; the Subdivisional Officer of Siliguri; the Road Overseer of Siliguri; the Revd. J. W. Charlton, of Nadia; Mr. W. Hamilton Holmes, of Madras; and Messrs. G. W. Deane and Company, of Madras.

34. The persons trained in the experimental methods of work during the year were—Gobardhan, Girish, Ashit, and Chaturbhuj, of Kagachira; Bholanath, Bishweshwar, Sripati, Rajani and Nabadvib, of Jot; Naderchand and Dindayal, of Mehedipur; Bonamali and Abadhuta, of Duna; Kalidas Ghose, of Batnagar; Lalit Mohan Banerjee, Satish Chundar Panda and Abdul Sheikh, of Berhampore; and Umanath and Premchand, of Kapashdanga, Nadia. Mr. Bipradas Paul Chaudhuri, of Natuda, also sent a man for training, but finding it inconvenient to stay at Berhampore he left after a fortnight.

35. A collection of dyed silks and dye-stuffs was made for the Imperial Institute during the year. Collections of Murshidabad silk fabrics were also made for Messrs. Tellery and Company and for the Empire of India Exhibition. Requests were received for silk exhibits for the Khulna, Magura, Cossipore and Alipur Agricultural shows, but they could be complied with only in the case of the Khulna Agricultural show, the expenses being defrayed by the local committee conducting this show.

36. The proposal to start a silk-weaving school in Murshidabad, originally recommended in Mr. E. W. Collin's Report on the Existing Arts and Industries in Bengal, 1890, was taken up during the year, some money being also collected for the purpose. The Collector of Murshidabad having reported, however, of there being no chance of the money required being raised by subscription in the district of Murshidabad, the scheme was dropped. It is to be hoped, however, that the grant of the Maharani Surnomoye, of Cossimbazar, of Rs. 20,000, made in the year of Her Imperial Majesty's Jubilee, for the advancement of technical education in Murshidabad, may yet be utilised for giving an impetus to the most important industry of the district.

37. A separate report has been submitted (No. 9, dated the 5th April 1895) about the insect pests which came under my observation during the year under report. These included a large-sized beetle destructive to wild mulberry cocoons and a Tachinid insect different from the ordinary silkworm fly of Bengal known in Malda as Kuji fly.

38. Advices on general agricultural subjects were sought by different parties, chiefly in connection with anthrax and foot-and-mouth disease. Twenty maunds of seed-potatoes were obtained from Naini Tal and sold to the parties who have been growing potatoes in this district since 1887. The Jerusalem artichoke being found to grow most luxuriantly in the jail garden at Berhampore for the last five years, four to five seers of roots being dug out from under each plant, the seed has been given out for trial to a few outsiders who have hitherto taken interest in scientific agriculture in this district. The subject of anthrax, which I had the privilege of studying at M. Pasteur's laboratory in Paris, naturally claimed my study in this district at the outbreak of this plague in 1888-89 and also during the last cold weather. This plague, popularly called *Guti* and *Basanta*, is the one that is most destructive to cattle all over India, and a mistake is widely prevalent that it is cow-pox, which is a perfectly harmless disease. In my letters Nos. 117, 133, and 134, dated respectively, the 22nd December 1894 and 19th January 1895, I fully stated my reasons for holding this plague to be

anthrax, and not rinderpest. With my letter No. 104, dated the 4th December 1894, I had also submitted microscopic preparations showing the bacilli connected with the plague. The plague among chickens, also called *Guti*, which usually prevails during every cold weather, prevailed in this district last February. The study of this disease has led me to infer that it is identical with fowl-cholera of Europe. Agricultural articles were contributed to the *Nabyabharat*, a vernacular journal which has a very wide circulation, during last year as in the previous year.

39. I had only one assistant during the year, Babu Abinash Chandra Sinha, who rendered me very efficient help. He was employed in one or other of the seed-rearing stations throughout the year, and he was never employed to do clerk's work at Berhampore.

E. J. H.—Reg. No. 1937J—625—19-8-95.

REVENUE DEPARTMENT.

AGRICULTURE.

DARJEELING, THE 14TH OCTOBER 1895.

RESOLUTION No. 729T.—R.

READ—

Letter No. 900A., dated the 30th August 1895, from the Board of Revenue, Land Revenue Department, submitting the Report of the Agricultural Department for the year 1894-95.

The Tenth Annual Report of the Department of Land Records and Agriculture on the subject of agricultural enquiry, agricultural experiments, and agricultural improvements, which was due to Government on the 15th, was not received from the Board until the 31st August 1895. The delay was due to the serious illness of Mr. Bhupal Chandra Basu and to the illness also of Mr. Nagendra Nath Banerjee, Assistant to the Director of the Department of Land Records and Agriculture, Bengal.

2. *Emigration to Burma.*—There was a slight increase in the number of emigrants from Bihar to Burma, five batches, consisting of 304 persons (all apparently from the district of Shahabad), having emigrated during the year, as against only one batch of 10 men, 8 women, 7 children, and 7 infants in the previous year. The arrangement made with the British India Steam Navigation Company for the conveyance of "State emigrants" from Bihar (including Monghyr and Bhagalpur), Chota Nagpur, and Orissa on payment by Government of a subsidy of Rs. 2-8 per head, subject to a maximum of Rs. 1,000 per annum, continued in force during the year. The Managing Agents of the Company made the following remarks on the subject of last year's emigration:—

"The satisfactory point about last year's working has been that the original settlers have sent home for their families and friends to join them in Burma. The men that have emigrated have been entirely of the agricultural class. We find that Biharis cannot compete successfully with Madrasis in the labour markets of the towns, but they are evidently doing well as settlers."

3. *Silk experiments.*—Mr. Nitya Gopal Mukerji was still employed during the year on the work of promoting the distribution and use of healthy silkworm seed. Four new rearing stations were opened by professional rearers with his assistance in silk-producing districts, viz., two in Malda and two in Birbhum. At the eleven rearing stations, 4,920½ kahans of seed-cocoons were raised during the year, while the quantity sold amounted to 798½ kahans, or 2,388 ounces, as against 1,035, 1,900, and 2,134 ounces sold in the three previous years. Considerable attention has been paid to silk experiments by amateur rearers as well, and among them may be mentioned the Reverend Mr. A. Campbell and the Reverend Mr. J. A. Graham, who have founded seed-rearing houses at Pokhuria and Kalimpong, respectively. The prospects of silk raising at the latter station are affected by the difficulty of disposing of the seed raised there, so that the receipts from the sale of seed-cocoons appear to be precarious.

The total expenditure incurred on silk experiments during the year was Rs. 8,259, against Rs. 7,955 expended in the preceding year. The results obtained by these experiments, which have now been continued for many years, may be mainly summed up by saying that it has been established that disease can be to a great extent avoided by keeping the silkworms clean, giving them more air, and feeding them more frequently, and only with mature leaves, than is common among the rearers. If to this be added instruction in the use of a microscope to detect diseased moths, it is certain that the production of Bengal silk will become as abundant and lucrative as it has been in years gone by. A further report from the Director has recently been received, and it has been decided that Mr. Nitya Gopal Mukerji's special work should be brought to a termination. A reduced establishment of subordinates only will be entertained

for a few months to wind up the experiments, in which Government has acted as a pioneer but cannot continue to spend the provincial revenues.

4. *Manure and Crop experiments.*—Agricultural experiments were carried on in the farms belonging to the Burdwan and Dumraon estates and in the Government farm at Sibpur, also in Government and wards' estates and by private individuals. The Director of Land Records and Agriculture writes:—

"The crops to which attention has been hitherto given in Bengal are—wheat, potatoes, and sugar-cane, and in a minor degree jute, paddy, oats, and English vegetables. From a perusal of the accounts of the experiments made last year, it will appear that, in spite of not infrequent failures, the merits of Naini Tal potatoes as compared with the local varieties have been brought home to a numerous body of agriculturists in different parts of Bengal * * * The distribution of Muzaffarnagar wheat to the tenants of the Dumraon Raj has also afforded a gratifying result."

The Board of Revenue remark on the discrepancy between the outturn of manure per bullock in the Dumraon and Sibpur farms. The statistics are obscurely recorded, but it would seem that each Dumraon bullock produced 43 maunds of manure in 120 days, while each Sibpur bullock produced 46 maunds in the whole year. The experiment should be continued, and the results recorded on a uniform basis.

Some improvements on the methods of cultivating sugar-cane have also been effected, as stated in last year's Resolution. Useful experiments were made in all three farms in methods of conserving cattle manure. It is as yet too early to make any deductions, but the experiments should be persisted in. Some new agricultural implements were tried, but with no very definite result. The method of planting sugar-cane in trenches is being adopted by raiyats in the neighbourhood of the Burdwan farm, its superiority to planting in shallow furrows having been fully demonstrated. An experiment tried last year yielded an increase in outturn of 22 maunds 12 seers of *gur* per acre and a net profit, after deducting cost of cultivation, of Rs. 109 per acre. The experiment of *ratooning* canes, which was commenced in 1887 and closed during the year under report, has shown that this method of cultivation gives a satisfactory outturn up to the fifth year, after which the yield rapidly lessens. A fine variety of paddy, obtained from Diamond Harbour, was found to yield a smaller outturn than the local coarse variety, but to give better financial results. The number of Burdwan raiyats who have adopted improved methods of cultivation increased to 81 in 1894-95, against 3, 4, 36, and 48 in the four preceding years. The site of the Dumraon farm was considered by the Agricultural Chemist to the Government of India to be unsuited for experimental purposes, and a new site, measuring about 31 acres, was selected near the railway station. The cultivation of sugar-cane in the small demonstration farm at Mainaguri in the Western Duars was satisfactory, the cultivators taking great interest in the method of making jaggery.

The criticisms made in paragraph 5 of last year's Resolution regarding crop experiments, to which exception has been taken in paragraph 48 of the report, were applied to the improvements attempted by private persons in wards' and other estates, and not to the efforts made by the Director and his Assistants in the direction of introducing new and improved crops.

5. *Veterinary Institution.*—Considering that the Bengal Veterinary Institution was in the first year of its existence, a fair measure of success was achieved. The total number of animals treated during the year was 662, which included 285 horses and ponies, 312 head of cattle, 53 dogs, and 12 sheep and goats. The daily average number of animals treated was 31. The number of operations performed during the year was 169. Twenty-six students appeared at the first half-yearly examination of 1895, and twenty passed successfully.

Besides attending to his duties at the Bengal Veterinary Institution, Veterinary Captain Gunn, the Superintendent, visited during the year thirteen districts of the Province for the purpose of combating and investigating cattle-disease, and in order to make enquiries with regard to cattle-breeding.

6. *Miscellaneous.*—The Department prepared and published during the course of the year general forecasts of *rabi*, *bhadoi*, winter rice and wheat, and also special reports on the early and late cotton crops. Agricultural exhibitions were held during the year at Cossipore, Kalimpong, Khulna, Berhampore in

Shahabad, Tentanga in Bhagalpur, Jaygunge in Dinajpur, and Goalundo. Of these, the exhibitions held at the four first-named places were assisted by Government with grants of money. The annual fairs at Alipur and Falakata in the Western Duars were also held during the year, and were assisted with money grants.

7. The total cost of the Department (independent of the pay of the superior establishment and the expenditure on silk experiments) was Rs. 9,428, against Rs. 8,895 in the previous year.

ORDER.—Ordered that the Resolution be published in the *Calcutta Gazette*, and that a copy of it, together with the report and the forwarding letter of the Board of Revenue, be submitted to the Government of India in the Revenue and Agricultural Department, and copy forwarded also to the Board of Revenue, Land Revenue Department.

By order of the Lieutenant-Governor of Bengal,

C. E. BUCKLAND,

Secretary to the Govt. of Bengal.

No. 730T.—R.

COPY forwarded to the Secretary the Board of Revenue, Land Revenue Department, for the information of the Board.

No. 731T.—R.

COPY forwarded to the Director of the Department of Land Records and Agriculture, Bengal, for information.

No. 732T.—R.

COPY, with copy of the report, forwarded to the Appointment Department of this office for information.

By order of the Lieutenant-Governor of Bengal,

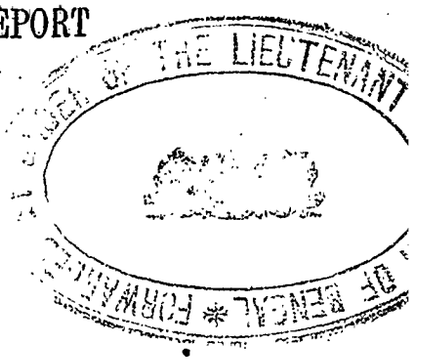
N. BONHAM-CARTER,

Under-Secretary to the Govt. of Bengal.

CALCUTTA;
The 14th October 1895.

W. M. D'C.—Reg. No. 4195C—721—24.10.95.

ANNUAL AGRICULTURAL REPORT



OF THE

DEPARTMENT OF LAND RECORDS AND AGRICULTURE

BENGAL,

For the year ending 31st March 1896.

133033

Calcutta:

BENGAL SECRETARIAT PRESS.

1896.

TABLE OF CONTENTS.

		Page.
CHAPTER	I.—Analysis of districts with reference to security from famine	1
CHAPTER	II.—Rent and revenue in precarious tracts	1
CHAPTER	III.—Measures of protection:—Emigration to Burma; Arboriculture; Silk experiments and eradication of pebrine; Locusts and other insect pests . .	1—5
CHAPTER	IV.—Agricultural experiments, including farms:—Experimental farms; Experiments in Government, Wards' and private estates; Crop experiments in jail gardens; Crop-cutting experiments in Bengal; Agricultural implements; Experiments made by members of the Agri-Horticultural Society of India .	5—16
CHAPTER	V.—The Bengal Veterinary Department—Cattle-breeding	16—17
CHAPTER	VI.—Notice of Agricultural statistics	18
CHAPTER	VII.—Miscellaneous:—Specification of inventions; Agricultural exhibitions; Supply of seeds, implements and manures; Cost of agricultural experiments; Officers of the Department	18—22

APPENDIX.

	Page.
A.—Mr. Nitya Gopal Mukerji's report on silk experiments	I IX

INDEX.

	Chapter.	Page.	Para.
Agricultural statistics	VI	18	38
——— exhibitions	VII	18—21	40
——— experiments and improvements in Wards', Government, and private estates	IV	10—13	19—27
——— implements	IV	14—15	30—34
Agri-Horticultural Society—Experiments by members of—	IV	15—16	35
Analysis of districts	I	1	3
Burdwan farm	IV	5—6	16
Burma emigration	III	1—2	5
Cattle-breeding	V	16—17	37
Cost of agricultural experiments	VII	22	43
Crop experiments in jail gardens	IV	13	28
Crop-cuttings by local officers	IV	13	29
Date-palm	III	2—3	
Divi-Divi tree	III	3	10
Dumraon farm	IV	6—8	17
Eucalyptus tree	III	3	9
Fungoid diseases	III	4—5	14
Insects injurious to crops	III	4	13
Locusts	III	4	12
Officers of the department	VII	22	44
Patents—Applications for	VII	18	39
Planting of trees	III	2	6
——— in Hazaribagh	III	2	7
Rent and revenue in precarious tracts	II	1	4
Sibpur farm	IV	8—10	18
Silkworm rearing experiments—Mr. Nitya Gopal Mukerji's	III	3—4	11
Supply of seeds, implements, and manures	VII	21	41
Veterinary Department, Bengal	V	16	36

OFFICE OF THE DIRECTOR OF THE DEPARTMENT OF LAND RECORDS AND AGRICULTURE, BENGAL.

No. 1359A.

FROM P. C. LYON, ESQ., C.S.,

Offg. Director of the Department of Land Records and Agriculture, Bengal,

TO THE SECRETARY TO THE BOARD OF REVENUE, L.P.

Dated Calcutta, the 25th August 1896.

SIR,

I HAVE the honour to submit the Report of this Department on agricultural enquiry, agricultural experiments, and agricultural improvements, for the year ending 31st March 1896. This is the eleventh Annual Report of this nature submitted by this Department. Mr. W. C. Macpherson was in charge of the Department up to the 18th February 1896.

2. The Report is divided under the following heads:—

Chapter I.—Analysis of Districts.
Chapter II.—Rent and revenue in precarious tracts.
Chapter III.—Measures of protection.
Chapter IV.—Agricultural experiments and improvements.
Chapter V.—The Bengal Veterinary Department; cattle-breeding.
Chapter VI.—Notice of agricultural statistics.
Chapter VII.—Miscellaneous.

CHAPTER I.

ANALYSIS OF DISTRICTS.

3. Owing to the illness of Mr. Bhupal Chandra Basu, Assistant Director, it was not found possible to undertake the analysis of another district during the year under report.

The analytical reports published up to date are the following:—

Mr. Ambica Charan Sen's Reports on Burdwan and Dacca.
Mr. Bhupal Chandra Basu's Report on Lohardaga.
Mr. Nagendra Nath Banerjei's Report on Cuttack.

CHAPTER II.

RENT AND REVENUE IN PRECARIOUS TRACTS.

4. No action requiring notice under this head was taken by this Department during the year under review. A full account of the settlements of rent and revenue which were in progress during the year, will be found in the Annual Report of this Department on Settlements.

CHAPTER III.

MEASURES OF PROTECTION.

5. *Emigration to Burma.*—The British India Steam Navigation Company continues to convey State emigrants to Burma, under the conditions mentioned in paragraph 7 of the Annual Agricultural Report of this Department for the year ending 31st March 1894.

The Managing Agents report thus on the subject of emigration from Bihar to Burma during the year :—

"Last year, some 304 emigrants travelled across: all of them having been recruited in the Shahabad district. This year, there is a great falling off; the actual numbers who travelled are as follows :—

Steamers.		Date of sailing.	Emigrants.
S. S. *Purnea*	...	23rd March 1895	97
„ *Patiala*	...	20th April 1895	1
„ *Lindula*	...	2nd November 1895	6
„ *Pundua*	...	23rd November 1895	32
			136

This shows a decrease of more than half the number that emigrated the previous year. The traffic, as in previous years, has gone on without the slightest hitch, and the sardars in charge of the men have been quite satisfied with the arrangements made for them.

We hope next year will show a great improvement in the number of men recruited for settlers in Burma."

6. *Arboriculture—Planting and maintenance of trees in Government and Wards' estates.*—The following information under this head has been obtained from the reports of local officers:—

In the Turka and Sujamutha Wards' estates in Midnapur, Rs. 56-7-3 and Rs. 98-5-6, respectively, were spent in the maintenance of orchards.

In the Maldwar Ward's estate in Dinajpur, the existing orchards and *lichi* gardens are still being maintained.

In the Sankarpur Ward's estate in Dinajpur, the teakwood and *sisu* plantations, comprising about 1,000 trees, established during the year 1893-94, are reported to be doing well. The plantations of mahogany, mango, *lichi* and *mahua* trees, about 200 in number, are also flourishing.

The Kalambag garden in the Burdhankati Ward's estate in Rangpur is reported to be in a very flourishing condition.

A sum of Rs. 34-2 was spent during the year for the maintenance of valuable trees planted in the Jaipur Government estates in Bogra.

7. *Planting of fruit-trees in Hazaribagh.*—Of the several grafts of apple trees supplied to the Superintendent of the Reformatory School at Hazaribagh in 1888 for experimental cultivation, only 10 are alive, and the Superintendent reports that of these only one bears good fruit. The grape vines continue to do well.

8. *Date-palms.*—The Deputy Commissioner of Hazaribagh reports that the five Arabian date-palms, grown from seedlings received in 1888 from the Director of the Botanical Department, Northern India, Saharanpur, have grown very little since last year. Their average height is now about $4\frac{3}{4}$ feet, and the average circumference of their stems, measured just above ground-level, is 1 foot and 10 inches. The 225 Tunisian date-palms, also received from Saharanpur in 1888, have not advanced much since last reported on, their average height being $4\frac{1}{2}$ feet, against $4\frac{1}{4}$ feet, the height reported last year. The average circumference of their stems, measured above ground-level, is about 18 inches, only an inch more than last year.

The Egyptian date-plams, planted in the German Mission compound in Ranchi in 1890, are reported to be steadily growing and to be all in good condition. The District Engineer of Patna confirms his unfavourable report of last year, that the result of the experiment with the Egyptian date-palm in Patna shows that the soil of the district is not suited to its cultivation. The number of trees in existence is 63. The Egyptian date-palms, which were reported last year to be growing well in the Sasaram Sub-divisional Officer's compound, and in the garden at Nasriganj, are now reported not to be thriving well, owing to the want of a proper water-supply. In Sirguja, Gangpur, and Jashpur, the Persian and Egyptian date-palms supplied to the Tributary Chiefs of those States are reported not to be doing well now. In Sirguja, out of the 11 reported last year to be living, 1 died during the year under report, and the remaining 10 are not thriving. In Gangpur, out of the 150 trees reported last year to be living, only 60 are now left. In Jashpur, almost all

the plants have been destroyed by white ants; the few that are still standing are reported to be stunted in their growth. In Lohardaga, the Persian and Egyptian date-palms, supplied to the Right Reverend the Bishop of Chota Nagpur and to Mr. R. C. Roy, Barrister-at-Law, are reported to be making very slow progress, though the plants are in healthy condition. An application for seed for further experiments has been received from pargana Tori in Lohardaga, where the date-palms which were experimentally cultivated have all died.

9. *Eucalyptus tree* (*Eucalyptus Globulus*).—The Deputy Commissioner of Hazaribagh has forwarded a satisfactory report of the experimental cultivation of the *Eucalyptus* tree in Hazaribagh. The trees, over one hundred in number, planted about eight years ago, are said to be thriving well. About a pound of seed was collected from them last year and sown in June last; germination was successful, and the young plants are reported to be thriving. The circumference of the trunks of the larger trees measure 4 feet 2 inches and 3 feet 4 inches respectively at 1 foot and 6 feet above ground-level, as against 3 feet and 2½ feet, the corresponding measurements reported last year. The average height of the trees is 60 feet. In 1894, the average height was reported to be 54 feet.

10. *Divi-Divi trees* (*Cæsalpinia Coriara*).—From the Report of the Deputy Conservator of Forests of the Sonthal Parganas Division, it appears that, owing to the want of transplantation, the trees in the compound of the Katikund bungalow are not thriving so well as they otherwise might have done. It is proposed to sow fresh seed during the current year and to transplant the small plants subsequently. The pods obtained from the trees at Katikund were very few, and not of much use. At Jhilimili, one maund of pods was collected from one tree, which is to be used for seed purposes. At the Dumka bungalow, there are said to be five good specimens of the *Divi-Divi*, the biggest of which covers an area of about 40 to 50 feet in diameter. Three maunds of pods were obtained from two of these trees. The soil and climate of the Sonthal Parganas are reported by the Deputy Conservator to be very suitable to the cultivation of this tree.

11. *Mr. Nitya Gopal Mukerji's work in combating silkworm disease.*—The sericultural experiments were continued during the year—for the first half-year under the direct supervision of Mr. Nitya Gopal Mukerji, and for the rest of the year under the general supervision of this Department. As the experiments proper had been concluded, it was considered unnecessary to continue to employ Mr. Mukerji in teaching cocoon-rearing cultivators the methods that had been found to be beneficial in arresting silk-worm epidemics, and accordingly in Government order No. 685T.R., dated the 11th October 1895, my predecessor's recommendation to withdraw Mr. Mukerji from his special work, and to continue the experiments under a subordinate establishment, was sanctioned. This continuance of the experiments under a travelling overseer and three assistant overseers was sanctioned tentatively up to the 31st March 1896, but as from Mr. Mukerji's Annual Report, which is appended to this Report as in former years, it appeared that there was reason to believe that the work of instructing cocoon-rearing cultivators has been carried on efficiently and with improving results by these men, the experiments have been still further prolonged.

The total quantity of seed-cocoons raised during the year in 11 experimental stations was 6,574 *káhans* (a *káhan* = 1,280 cocoons), as compared with 4,860 *káhans* raised in 1894-95. Of the 6,574 *káhans*, 1,351 *káhans* (or a little more than $\frac{1}{5}$th of the produce) were bought by cocoon-rearing cultivators for seed in 1895-96, as compared with 738 *káhans* (or about $\frac{1}{7}$th of the produce) bought by them in 1894-95. Representing the result in ounces of eggs sold for seed instead of in *káhans* of seed-cocoons, the progress of the experiment during the last five years may be indicated by the following figures:—

Year.	Quantity of eggs sold in ounces.
1891-92	1,035
1892-93	1,900
1893-94	2,134
1894-95	2,388
1895-96	4,500

Although there has been steady progress both in the quantity and proportion of seed sold to cocoon-rearing cultivators from the experimental statons, the sale of seed has not advanced so rapidly as might have been expected. Mr. Mukerji explains that a custom prevails throughout the silk districts for villagers to exchange seed, *i.e.*, to go to some distant place, sometimes hundreds of miles away, in quest of seed, and to avoid using seed raised in their own *jóár* or neighbourhood. He considers this a good custom, but one which hinders the rapid sale of the experimental seed. While the villagers appreciate the good quality of the experimental seed, and a few (and an increasing number) buy it, the bulk of them still go in search of seed to their accustomed haunts. There are some three or four recognized centres (called *jóárs*) in each of the silk districts to which cocoon-rearers throughout Bengal go in quest of seed, and Mr. Mukerji recommends that a nursery where microscopic selection of seed will be practised, rational methods of feeding and cleaning pursued, and the value of these methods systematically explained to the children of the seed rearers, should be established in each of these centres, three being opened each year until they have all been supplied. Last year, three such nurseries were established—one near Berhampur (district Murshidabad), another near Rampur Boalia (district Rajshahi), and the third at Garhbeta (district Midnapur).

Mr. Mukerji has recorded the results of his experiments and observations in sericulture in an illustrated Bengali Manual, which he has published at his own expense, and the sanction of Government has been obtained by this Department to the official publication of an English translation of the book.

12. *Locusts.*—Locusts did not appear during the year in any of the districts of these Provinces.

13. *Other insects injurious to crops.*—The following information has been received with regard to the injury done to crops by insects in these Provinces:—In Tippera, some slight damage was done to the paddy crops during November and December 1895 by a white caterpillar not more than one or two inches in length and of a dull greenish colour, which appeared in the greatest numbers on cloudy days. Similar caterpillars also damaged the jute crop to some extent in the same district. In Noakhali, insects, known locally as *leda mowa* and *chanipoka*, are reported to have damaged the rice crops to some extent in thanas Hatia, Lakhipur, Begumganj, Chagalniya, and Feni after the cyclone of October 1895. In Raujan, in the district of Chittagong, the paddy crop was much damaged by the *ledapoka*, especially in inundated lands. In Satkania, in the same district, the crops were slightly injured by insects known locally as *leda* and *gunguni*. In the Sarail estate, the mustard crop was injured to some extent by a caterpillar. Injury to crops is also reported from the estate of Raj Kissen Banerji, in thana Mesira of the district of Chittagong. In Jessore, a species of insect called *jab* is reported to have done some injury to mustard crops in the Narail sub-division, and to *aman* paddy in the Magura sub-division. In the Narayanganj sub-division of the district of Dacca, slight injury was done to mustard and rape by red beetles and white cut-worms, which usually appear on these crops during cloudy weather. Insects injurious to paddy made their appearance in all sub-divisions of the Backerganj district, but did not affect the crops much. In the Khondmal sub-division of the Angul district, slight damage was done to the *sarad* paddy crop by caterpillars. In the Mokameh and Futwa thanas, within the jurisdiction of the Barh sub-division of the district of Patna, the *rabi* crops in a considerable area, six to seven thousand bighas in Mokameh alone, were destroyed by a kind of insect called "*kajra.*" The wheat crop was damaged, to some extent, by an insect pest locally known as "*katui,*" in the Bhabhua and Buxar sub-division of the district of Shahabad. In the Sadar thana of Darbhanga, crops are reported to have been only slightly injured by insects.

14. *Fungoid diseases.*—In consequence of the receipt of information from the districts of Noakhali and Backerganj of the prevalence of a widespread plague among betelnut trees, Mr. N. G. Mukerji made a tour of investigation in these districts, and submitted a report, dated 24th March 1896, on the subject. This report was forwarded to Government, and since the close of the year, further enquiries have been made by Dr. G. Watt, Reporter on Economic Products to the Government of India, and also by Dr. G. King, Superintendent of the

Royal Botanical Gardens, into the origin and cause of the disease, which is due to the action of a parasitic fungus. This important subject is still under consideration, with a view to the ultimate adoption of preventive measures.

A widespread fungoid epidemic among *pán* plants, which has seriously affected the price of *pán*, has also been reported on by Mr. Mukerji.

Dr. Prain, Curator of the Herbarium in the Royal Botanical Gardens, is engaged on important enquiries relative to rust in wheat which are not yet complete, and Mr. N. G. Mukerji has also made some useful experiments, which he has reported on in his Annual Report for the Sibpur Farm, in protecting wheat seed from rust and from the attacks of insects.

CHAPTER IV.

AGRICULTURAL EXPERIMENTS AND IMPROVEMENTS.

15. *Experimental Farms*—In accordance with the standing orders of the Government of India, only a brief description is given in this report of the work done on the Experimental Farms at Burdwan, Dumraon and Sibpur. Details of the cultivation on these Farms will be found in the Farm reports for the year, which have been separately published.

16. *Burdwan Farm.*—This Farm was in charge of Mr. N. N. Banerjei throughout the year under report. The operations of the Farm during the year comprised experiments with manures and implements, experiments in methods of cultivation and with varieties of crops, and in the conservation of cattle dung. Much attention was also given to the distribution of good seed of different kinds of crops and good manure among the cultivators in the neighbourhood of the Farm, a reference to which will be found on page 10 of this Report.

(1) *Experiments with manures.*—These were intended to ascertain the effects of different manures on paddy, jute, sugarcaue and potatoes. The most important experiments with paddy were those instituted to test the value of a mixture of bonemeal and saltpetre as a manure for that crop. These experiments were most successful, and the application of this manure proved very profitable.

The results obtained from the manure experiment with jute were corroborative of the experience of the previous six years, showing that cowdung is a better manure for the crop than castor cake, bonemeal, superphosphate or saltpetre. Under Dr. Leather's instructions, this experiment will be conducted in future in fresh plots. The highest outturn in the experiment amounted to 18 maunds per acre. The seed used was obtained from Sirajganj. The quality of the fibre produced was better than that of the fibre sold in the Burdwan market, being of a longer staple and stronger and more silky, and the price obtained for it was accordingly about 4 annas more per maund. This variety of jute has found favour with neighbouring cultivators.

The manure experiment with sugarcane failed for want of water.

With potatoes it was found, as in the previous year, that the best outturn was obtained from the use of cowdung. The two contrasted manures—castor cake and bonemeal—gave unequal results during the two years during which the experiment has been conducted. The cowdung plot yielded during the year 242 maunds of potatoes per acre, and the unmanured plot only 61 maunds per acre. Cowdung raised the outturn fourfold, and, as with paddy, more than recouped the expenditure incurred in its application. Valuing the potatoes at the price at which they were sold at the market, viz., Rs. 1-5 per maund, the nett profit from the manured plot, after deducting all costs of cultivation and manuring, amounted to Rs. 85 per acre, while the unmanured plot showed a loss of Rs. 83 per acre.

(2) *Trials with improved implements.*—The only improved implement tested on the Farm was the Sibpur plough, and the experiments made with this plough were not conclusive. Arrangements are being made to test further implements in the current year.

(3) *Experiments in methods of cultivation.*—The crops experimented with under this head were paddy, sugarcane and potatoes. With paddy, the experiments were designed to ascertain the effects of thick and thin sowing, and to test the results of the selection of seed. Thick sowing was made at the rate of

30 seers per acre, and thin at the rate of 15 seers per acre, the latter being the quantity ordinarily used for sowing by neighbouring cultivators. There was a nominal increase of 10 seers of grain per acre in favour of thick sowing. The selection of seed is designed to improve the quantity and quality of the grain. The best plants of the previous year's crop were chosen, and seed obtained from the best ears of these plants. This seed was sown in contrast with seed ordinarily stored without any attempt at selection. The result of one year's selection led to an increase in the outturn of the grain of $2\frac{1}{2}$ maunds per acre, but the effects of selection were more marked in the quality of grain produced from selected seed, which was plumper and bolder. Both these experiments are to be continued and should lead to interesting results.

With sugarcane, the experiments of the previous year were continued. Trenching gave decidedly better results than planting in shallow furrows according to the local method. In one series, trenching gave an increase of 13 maunds 13 seers of *gur* per acre, and in a second series the increase amounted to 28 maunds 13 seers per acre. These increases, calculated at the price at which the *gur* was actually sold, represent nett profits (after deduction of cost of trenching and all other costs of cultivation) of Rs. 32 and Rs. 58 per acre respectively.

The *ratooning* experiment having been brought to a completion last year after a period of seven years, the experiment has been renewed in a new plot of land to obtain corroborative experience. The first year's crop is now standing on the ground and promises to give a good outturn.

At Dr. Leather's suggestion, experiments were undertaken with Naini Tal potatoes in order to compare the merits of whole tubers and cut sets for sowing. The results seemed to point to a pecuniary advantage in planting cut sets, but the experiments are to be continued for several years, and the figures deduced from the first year's working can afford us no safe conclusions.

(4) *Experiments with varieties of crops.*—The experiments under this head were designed to ascertain the relative merits in point of productiveness of different varieties of paddy, sugarcane, potatoes, and oats. Six varieties of paddy were experimented with, viz., three varieties of fine paddy (Diamond Harbour, Dehra Dun, Burdwan *bansmati*,) and three of coarse paddy (all grown in the district). The coarse paddy gave a larger outturn in each case, but the better prices obtained for the fine varieties made them in almost every case the more profitable crops to cultivate.

The variety experiment with sugarcane failed for want of water.

Naini-Tal potatoes were contrasted with the country variety of potatoes and with Cherrapunji potatoes. The experiment, which will be continued for some years, appeared to show a great superiority in the Naini Tal variety.

The country variety of oats, seed of which was obtained from Dumraon, was grown in contrast with Australian oats. The latter grew vigorously, but ultimately went entirely to straw. The country variety gave an outturn of 14 maunds 4 seers of grain and 21 maunds 7 seers of straw per acre. The experiment will be renewed next *rabi* season.

(5) *Expenditure and receipts of the Farm.*—The gross expenditure of the Farm amounted to Rs. 2,278, and the gross receipts to Rs. 1,018. The corresponding figures for 1894-95 were Rs. 2,172-3-3 and Rs. 1,145-1-9. The increase in expenditure was due to a further extension of the Farm during the year under report.

17. *The Dumraon Farms.*—Two experimental Farms were maintained at Dumraon during the year under the supervision of Mr. Banerjei. The first of these is situated at Pareswana, about 2 miles to the west of the town of Dumraon. It was established in 1885, and at the suggestion of Dr. Leather has now been abandoned on account of its unsuitability for experimental purposes. In place of the Pareswana Farm, a new Farm has been established on the Railway line, where experimental cultivation was commenced last year, and will be carried on in future. The same experiments were conducted here as at Burdwan. They were—

(1) *Experiments with manures.*—At Pareswana, which consists of a stiff, clayey soil, it was found, as in previous years, that bonemeal is of no value as a manure for *khesari* or paddy, and although a mixture of bonemeal and saltpetre, when applied to wheat in the same Farm, increased the outturn of the

plots to which it was applied, the increase was not so great as to cover the extra cost of procuring and applying the manure. An experiment with saltpetre alone on the same crop gave similar results, as although the outturn was considerably improved, the increase did not cover the extra cost of manuring.

An experiment with sugarcane at Pareswana showed that cowdung and ashes of cowdung gave a slightly larger outturn of *gur* than castor cake and ashes of cowdung, and that in point of outturn both these mixtures were decidedly superior to ashes of cowdung alone.

In the new Farm, several experiments in the manuring of wheat were commenced in the year under report, and will be continued for several years. It is unnecessary here to detail the results of the first year's working, which tended to show the great value of cowdung as compared with other manures, and the large net profit to be obtained from irrigation.

(2) *Trials with implements.*—Nothing was done under this head beyond a few inconclusive experiments with the Sibpur plough. But further experiments with other implements are to be made during the current year.

(3) *Experiments in methods of cultivation.*—At Pareswana, two experiments, viz., (i) with paddy and *khesari*, and (ii) with wheat, were made in order to contrast the merits of deep and shallow ploughing. The former cultivation was effected with the Sibpur plough, which reached a depth of 5 inches, and the latter with a local plough which worked 3 inches deep. The results of these experiments were in favour of deep ploughing, as the value of the increase in outturn more than covered the extra cost of cultivation.

The Mauritius system of planting sugarcane in trenches was contrasted in both the Farms with the ordinary Bihar system of planting in irregular shallow furrows. At Pareswana, the experiment was tried with the local (Mungo) variety only, and on the new Farm with the Mungo and Bhurli varieties. The results obtained on the two Farms were corroborative, and confirmed the experience of previous years in favour of trench-planting. The increase in outturn per acre of *gur* obtained, due to this method of planting, was as follows:—

	Mds.	Srs.
Average increase by trenching on the Pareswana Farm in the Mungo variety	1	25
Increase by trenching on the new Farm in the Mungo variety	13	29
Increase by trenching on the new Farm in the Bhurli variety	6	32

The same experiments in the sowing of potatoes were conducted here as in Burdwan, and cut sets were contrasted with whole tubers as seed. The outturn of the latter was much heavier, but did not compensate for the increased cost in seed.

(4) *Experiments in crops and new varieties of existing crops.*—Muzaffarnagar white wheat was grown in contrast with Buxar white (local) and the local red wheat at Pareswana, and the merits of ten varieties of wheat (viz., two local varieties, two varieties from Muzaffarnagar, two from the Punjab, and four from the Central Provinces) were tested on the new Farm. Muzaffarnagar white wheat had been tried in previous years at Pareswana against the local white and red varieties and found to yield a larger outturn than the two latter, although, as noticed in the last Annual Report, it was found to show marks of deterioration after cultivation for two or three years, both as regards quality and productive power. In order to further test its qualities, its cultivation was commenced again in 1894-95 at Pareswana and continued during the year under report. The results obtained during the two years proved it to be superior to the local varieties of wheat. It was found that, while Muzaffarnagar wheat was not at all attacked by rust, both the local varieties suffered from this disease. The outturn in each case was, however, low, owing to the unfavourable character of the last two seasons.

With regard to the ten varieties tried on the new Farm, it may be remarked that during this, the first year of the experiment, the varieties from the Central Provinces proved decidedly inferior to the others, all of which gave about equal results. The latter yielded on an average 6 maunds 20 seers of

grain per acre, and 29 maunds 14 seers of straw per acre, and the former 3 maunds 23 seers of grain per acre, and 24 maunds 16 seers of straw per acre.

The other crops experimented with under this head were potatoes and sugarcane, which were grown on the new Farm. The experiments will be continued for some years and the results compared.

A small quantity of Dehra Dun paddy was also grown at Pareswana. It recommends itself as an early variety. Seed has been preserved to put the variety to further test on the new Farm during the current year.

(5) *Receipts and expenditure.*—The gross expenditure of the Farms at Dumraon, including the maintenance of an Economic Museum, amounted to Rs. 3,502, against Rs. 2,628 expended during 1894-95. Much of this money was expended in permanent works on the new Farm. The receipts of the Farms amounted to Rs. 845 against Rs. 677 in the preceding year.

(6) *Conservation of cattle-dung at the Burdwan and Dumraon Farms.*—Much attention continued to be devoted during the year to the proper conservation of dung in the Burdwan and Dumraon Farms. The mode of conservation was described in page 11 of the Annual Report of this Department for 1894-95, and need not be repeated here. The results obtained were as follows:—The total weight of manure collected at Burdwan since the commencement of the experiment amounted to 30,743 lbs. or roughly 385 maunds. This was produced by six bullocks kept in the stalls for 12 hours per day for 292 days, shewing that each bullock yielded 8·7 seers of manure per day of 12 hours. The quantity of manure collected at Dumraon since the commencement of the experiment amounted to 175,952 lbs., or 2,199 maunds The manure was produced by an average of 12 bullocks confined in the stalls for 13 hours a day for 627 days. This gives an outturn for each bullock of 11·7 seers per day of 13 hours or 10·8 seers per day of 12 hours.

Samples of the manure thus collected were submitted to Dr. Leather for analysis before being used for the crops of the Farms. The results recently obtained from Dr. Leather of two samples showed that the Burdwan Farm manure contained ·55 per cent. of nitrogen and 67·80 per cent. of water, and the Dumraon Farm manure ·99 per cent. of nitrogen and 12·20 per cent. of water. In other words, the Burdwan sample contained 1·67 per cent. nitrogen and the Dumraon sample 1·13 per cent. on the dry weight.

18. *The Sibpur Farm.*—This is the only experimental Farm in Bengal which is maintained at Government expense. It was originally established as an appendage to a proposed agricultural class, but the class has not yet been opened, although proposals for its establishment are now under consideration. The Annual Report by Mr. N. G. Mukerji, submitted separately, contains a full account of the working of the Farm, and only an abstract of the chief operations undertaken is given below.

(1) *Cultivation of different varieties of Bengal wheat.*—The object of this experiment was to make a botanical study of the wheat plants from the time of germination to the ripening of seed. This was kindly undertaken by Dr. Prain, Curator of the Royal Botanical Gardens at Sibpur, who has submitted a valuable Report on the subject, which is to be published separately by this Department. Seed was obtained from all the wheat districts, but only 82 packets that arrived before the 25th of November, were sown. The season being abnormally dry, sowing after this date would have given unsatisfactory results. In fact, owing to the want of rain, none of the sowing was successful, and this cause, combined with the ravages of insects and rust, made it impossible to compare the yield of the different varieties. They proved, however, no hindrance to the botanical study of the plants, which was the main object of the experiment. In addition to the valuable information obtained by Dr. Prain from this experiment, Mr. N. G. Mukerji was enabled to make some important general deductions, as to the advantage of early sowing, the localities from which the best varieties of wheat are obtainable, and as to the best way of preparing the seeds for sowing, all of which have been detailed by him in his report.

(2) *Manure experiments.*—Variety in the soil of the Sibpur Farm greatly affects the value of these experiments. They were only made with potatoes, peas and cabbages, and the only valuable conclusion which can be derived from

them is that crude saltpetre, applied at the rate of 500 lbs. per acre, is an excellent manure for cabbages, bringing them on quickly and improving the outturn. Mr. Mukerji has not been successful, however, in inducing the cultivators of cabbages in the neighbourhood to adopt this manure in the place of castor cake, the initial cost of the saltpetre being heavier. And it is alleged that the flavour of the vegetable is affected by the saltpetre. But Mr. Mukerji after personally testing cabbages grown with saltpetre manure, does not believe this.

(3) *Use of new and improved implements.*—The Sibpur plough, the American hoe called "Planet Jr.," the Behea sugarcane mill, the chaff-cutter, and the Barakar water-lift continued to give satisfaction during the year. A spraying machine called "Eclair Vaporiser" was used for spraying insecticides and fungicides, and it is reported to be very useful for this purpose.

(4) *Experiments in new methods of cultivation.*—There is little to report under this head. The varied results of the experiments in deep and shallow ploughing prevent any conclusions being drawn, while the result of the experiment in double and single row planting of potatoes contradicted the results obtained in the two previous years. The experiment suggested by Dr. Leather in the sowing of potatoes was inaugurated with results generally confirming those reported from Burdwan and Dumraon.

The *ratooning* experiment with *khari* sugarcane shows that for five years the yield has continued undiminished. This experiment has succeeded for so many years in the Burdwan and the Sibpur Experimental Farms, that the system of *ratooning* with this variety of the plant may now be confidently recommended. The demand for cuttings of *khari* sugarcane has been steadily increasing.

(5) *Experiments with new crops amd new varieties of existing crops.*—The new crops successfully grown on the Farm, but on a very small scale, were 10 superior varieties of tobacco, Russian sunflower, and American melon. In each case, the plants grown were seeded, and the seed kept for experiments on a larger scale during the present year.

The experiments with varieties of potato seeds tended to confirm the superiority of those from Naini Tal.

Eleven varieties of sugarcane were experimented with during the year. The heaviest crops were obtained from the White Bombay and the *shamshara* varieties, which yielded also the best *gur*, but the *khari* variety, while yielding one of the heaviest crops, gave the worst *gur* of all.

The fodder crops grown during the year were *guinea-grass*, *reana luxurians* and *sorghum*. *Guinea-grass* and *sorghum* gave the best results, and as *guinea-grass* is a perennial, the popularising of the cultivation of this fodder-grass among cultivators appears to be desirable. The fodder crops were grown in each case without artificial irrigation, and with ordinary natural manures, as they would ordinarily be cultivated by a *raiyat*. The following table summarises the results of last year's experiments with fodder crops in this Farm :—

Name of Fodder.	Cultivation.	Manuring.	Outturn per acre.		
1	2	3	4		
			Mds.	srs.	lbs.
Sorghum ...	7 ploughings ; no irrigation.	Vegetable mould, 150 mds. (12,343 lbs.) per acre.	397	37	(32,744)
Ditto ...	Ditto ...	Cowdung, 75 maunds (6,171 lbs.) per acre.	349	12	(28,742)
Ditto ...	Ditto ...	No manure	302	20	(24,891)
Guinea-grass ...	2 ploughings ; no irrigation.	Vegetable mould, 150 mds. (12,343 lbs.) per acre.	301	35	(24,841)
Ditto ...	Ditto ...	Cowdung, 75 maunds (6,171 lbs.) per acre.	315	11	(25,943)
Reana luxurians	6 ploughings ; no irrigation.	Vegetable mould, 150 mds. (12,343 lbs.) per acre.	284	14	(23,398)

(6) *Conservation of natural manures.*—There used to be only two uncovered manure pits in the Farm. Four more were added during the year, and a shed put up over them. Six kinds of natural manure are being stored in the pits for a new series of experiments. These are (1) cowdung ; (2) cowdung and cow urine ; (3) horse, goat, and other dung ; (4) tank weeds ; (5) ashes and farm refuse, chiefly dry leaves, and (6) weeds in flower, old and useless seeds and decayed flowers, *e.g.*, *bombax* flowers.

(7) *Experiments with Insecticides and Fungicides.*—Kerosine emulsion made by shaking together equal parts of kerosine oil and sour skimmed milk and added to 50 parts of water, applied with the Eclair Vaporiser on wheat seedlings attacked with insects, stopped all further damage from them. Cabbage seedlings attacked with insects were treated with a dry powder consisting of rape dust 2 parts, lime 1 part, cowdung ashes 1 part, and white arsenic (the *sankhya* of the bazar) $\frac{1}{200}$ part, dusted by means of little calico bags. This application also stopped all further damage from insects. The "pickling" of all seeds, including potato tubers and sugarcane cuttings, in the following manner is now done in the Sibpur Farm as a preventive against fungus and insect attacks:—The seed is dipped for an instant in a half per cent. solution of sulphate of copper, and dried immediately afterwards with a mixture of insecticidal and manurial substances consisting of 40 lbs. of rape dust, 20 lbs. of lime, 20 lbs. of ashes, 1 lb. of soot, and $\frac{1}{8}$th lb. of white arsenic. A $\frac{1}{2}$ per cent. solution of sulphate of copper was sprayed on the wheat plants when rust broke out among them. Mr. Mukerji thinks this had some deterrent effect.

(8) *Receipts and Expenditure of the Farm.*—The gross expenditure of the Farm came to Rs. 3,229-4-11 during the year, as against Rs. 2,590-15-2 and Rs. 2,433-12-9 during the two previous years. The receipts amounted last year to Rs. 1,265-7-3, as against Rs. 981-8-8 and Rs. 1,013-9-9 during the two previous years. The nett cost of maintaining the Farm during 1895-96, 1894-95, and 1893-94 was respectively Rs. 1,963-13-8, Rs. 1,609-6-6, and Rs. 1,420-7-0. The increase in cost during the year was due to expenditure incurred in cleaning the *jhil* at the Farm, and in rearranging the plots for future experiments.

Agricultural experiments and the introduction of new and improved staples in Government, Wards', and Private Estates.

19. The following is a brief account of the agricultural experiments and the introduction of new methods and staples undertaken, assisted or encouraged by this Department during the year in Government, Wards', and private estates:—

Burdwan Division.

20. *Burdwan—Private individuals.*—Mr. Banerjei, Assistant Director, reports that the work of introducing new varieties of crops, improved methods of cultivation, and selected seed is being steadily pushed on among the cultivators in the neighbourhood of the Burdwan Farm. It was mentioned in the last Agricultural Report of this Department that the number of such cultivators who worked on improved methods in the year 1891 was only 3, and that the number had risen to 81 during the year 1894-95. During the year under report, 96 cultivators undertook the cultivation of fine paddy, sugarcane, jute, Naini Tal potatoes, oats, &c., with selected seed, and under the direction of Mr. Banerjei and the Overseer of the Burdwan Farm. The outturn of the potato crops appears to have been generally satisfactory. With regard to the introduction of Naini Tal potatoes into the villages near the Farm, the Manager of the Burdwan Raj remarks:—"Whereas generally good country potatoes could scarcely be had in the Burdwan market, better Naini Tal potatoes are actually sent out of Burdwan"; and the Collector of Burdwan adds:—"I anticipate that Naini Tal potatoes will be widely appreciated, and that large areas will be cultivated with this paying crop." Jute, which was not formerly grown at all within some distance from the Farm, is being now cultivated by several *raiyats*, from Sirajganj seed supplied by this Department, and higher prices are obtained by them for the jute thus grown than

for the ordinary local jute. Sugarcane, which was originally grown in narrow irregular furrows by the neighbouring cultivators, is now regularly planted by them in trenches, with the result that a better outturn is obtained than formerly. In addition to the adoption of improved methods of cultivation, two cultivators have been induced to conserve cowdung and cow urine in pits as is the practice on the Farm.

Babu Raghu Nath Banerji, a zamindar of Kalikapur, in the district of Bankura, who was supplied during the year with seed of jute, fine paddy, and Naini Tal potatoes, reports that the outturn of his jute crop amounted to seven maunds and 30 seers per *bigha*, and that of Naini Tal potatoes to 40 maunds per bigha. These two crops being new to his village, it is hoped that these highly satisfactory results may induce the villagers to take to their cultivation. Fine paddy gave a fair outturn of 10 maunds 30 seers of grain per *bigha*.

Babu Satish Chandra Mukerji tried the cultivation of *khaki* cotton in Hooghly with seed supplied by this Department. He is so far satisfied with the results obtained, that he proposes to renew the experiment. The sample of cotton produced was of a very fair quality.

21. *Experimental cultivation of long-stemmed paddy in Contai*—Some low-lying tracts of the Contai subdivision of Midnapur, known as the Argoal and Udbadal circuits, which have suffered from repeated failures of crops for the last ten years, were chosen for this experiment. These tracts include *khas mahal* lands, worth an annual revenue of about Rs. 34,000, for which remissions of revenue on account of the destruction of crops by floods had to be granted to the amount of Rs. 13,216 for the years 1886 to 1890, and for which a further remission of Rs. 26,834 has been proposed for 1891 to 1895. Cultivation of *boro* paddy, after the subsidence of the flood, was first attempted as a possible remedy; but the experiment failed in every instance, probably because the surface soil is impregnated with salt in the dry season. The cultivation of long-stemmed paddy since 1890 has met with no better success. In February 1896, this Department sent a cultivator from Backerganj, experienced in the cultivation of this variety of paddy, with 6 maunds of seed, but Mr. N. G. Mukerji, Assistant Director, who was sent to inspect the experimental tract last May, reports that the experiment is not likely to meet with any better success this year than it did in previous years. The reason he assigns for this failure is that the sowing of the seed has to be done in the land subject to floods, after the early rains have washed away the saline deposit, that is, not before the regular monsoon season has commenced. The seedlings, therefore, are hardly a foot high before the annual floods cover the land to a depth of 5 or 6 feet, and even this particular variety of paddy is not strong enough to thrive in such circumstances.

Presidency Division.

22. *24-Parganas—Private individuals.*—Jute was successfully cultivated by Babu Chandra Nath Chaudhuri, of Baraset, from Sirajganj seed supplied from this Department. The fibre is reported to have sold at the rate of Rs. 8 per maund, which speaks favourably of the quality produced.

Jessore—The cultivation of English vegetables was undertaken by Babu Sitanath Ghose of Jessore, but the results were unsatisfactory.

Khulna—Babu Baroda Prosad Mozumdar, of Khulna, who undertook the cultivation of Naini Tal potatoes last *rabi* season, states that his success has convinced many of his neighbours that successful potato cultivation is not an impossibility in Khulna.

Nadia—As reported last year, Mr. B. Pal Chaudhuri, of Natuda, undertook the cultivation of tobacco on his Model Farm. The varieties of tobacco previously planted by him, mentioned in last year's report, grew very well at first and promised a good outturn, but unfortunately a hailstorm early in March injured the crop and spoiled the leaves for the manufacture of cigars. It is said that two varieties, viz., Landreths and Rose Musket, gave better results than the rest. The yield per bigha of these varieties amounted to 2 maunds, and that of the others to 1 maund. Mr. Pal Chaudhuri has not furnished an account of the other crops grown on his Farm.

Rajshahi Division.

23. *Jalpaiguri*—In last year's Agricultural Report, an account was given of the efforts to introduce the cultivation of Naini Tal potatoes in the Western Duars. During the year under report, 50 maunds of Naini Tal potato seed were supplied to the Subdivisional Officer of Alipur. Of this quantity, 45½ maunds were distributed among *jotedars* of the 3 *tahsils* of Falakata, Alipur and Bhalka. The outturn of potatoes is reported to have been generally good, except in the Bhalka *tahsil*, where the crop suffered considerably from floods. White-ants also injured the crop in Bhalka and Majerdabri. In Falakata and Alipur, the outturn was 10 times the quantity of the seed sown, and in one instance, in the Bhalka *tahsil*, the yield from 10 seers of seed planted was 4 maunds. Sugarcane cultivation in the Mynaguri *tahsil* did not prove a success. Some vegetable seeds were supplied to the Subdivisional Officer of Alipur which were distributed among the *raiyats*, but the cultivation was not successful.

The Model Farm at Mynaguri was abolished on the 1st April 1896, on the recommendation of Dr. Leather, Agricultural Chemist to the Government of India, as it was not found possible for this Department to supervise it adequately.

Chittagong Division.

24. Very little was done in the way of experimental cultivation in the Ward's estates or *khas mehals* in this Division in the year under report, but the Commissioner is anxious to experiment with varieties of tobacco, a crop suitable to the locality, and has been supplied with seed by this Department. Something is also to be done to improve the beed of cattle in the Division, and bulls are to be imported for this purpose.

Patna Division.

25. *Shahabad.*—Sugarcane cultivation was undertaken under Mr. Mylne's improved process with fair results in one private estate in Shahabad.

Dumraon.—Since the year 1893-94 rust has very severely injured the prospects of the indigenous wheat crops of the Shahabad district. The local soft white wheat of Buxar, which is largely grown in the Dumraon Raj, has the reputation of being one of the best varieties of wheat in the market. Owing to its almost total destruction by rust in 1893-94, it was found advisable to attempt to substitute for it a foreign variety equal to it in point of productiveness and quality. Accordingly, through the exertions of the Magistrate of Shahabad, the Sub-divisional Officer of Buxar, and the Dewan of the Dumraon Raj, 250 maunds of selected Muzaffarnagar wheat seed were imported during the *rabi* season of 1894-95, and distributed among the tenants of the Raj at cost price. In spite of the re-appearance of rust during that season, it was found that the Muzaffarnagar wheat did much better than the local varieties. Owing to this comparative success, 330 maunds of Muzaffarnagar wheat were again imported by the Dewan during the last *rabi* season for the tenants of the Raj, who were glad to accept the seed at a price which enabled the Raj, when disposing of the seed, to recoup itself for the cost of transit from Muzaffarnagar to Dumraon. The outturn obtained by cultivators last year from this seed was not high on account of the unfavourable character of the season; but the experiment has so far proved successful that it is expected there will be a much greater demand for Muzaffarnagar seed during the next *rabi* season.

The successful cultivation of Naini Tal potatoes at the Bhojpur Farm in Dumraon has induced many *raiyats* to adopt its cultivation in preference to growing their own varieties, seed of which they obtain from Bettiah and Ghazipur. Last year, 50 maunds of Naini Tal seed potatoes were distributed to the cultivators of Bhojpur, Dumraon, Dhakaich, and other villages. No actual figures of outturn are available, but Mr. Banerjei, who inspected the Naini Tal potato crops in some of these villages, reports that the results obtained were satisfactory. In every case that came under his notice, the outturn from Naini Tal seed was found to be higher than the outturn of local varieties. The *raiyats* themselves are pleased with their success.

Orissa Division.

26. Cuttings of *Khari*, Bombay, and *Samshara* sugarcane were supplied to the Subdivisional Officer of Khurda for experimental cultivation last February. The results will not be known till next year.

Chota Nagpur Division.

27. *Lohardaga Wards' and Encumbered Estates.*—Naini Tal potatoes, cabbages, and other English vegetables were cultivated in the two encumbered estates of Bassia and Burhadali, and in the Jheria Wards' estates. At Burhadali, the outturn of potatoes obtained was tenfold of the seed sown, in spite of want of rain. English vegetables, with the exception of peas, gave bad results. No report has been received from Bassia and Jheria.

Fodder and silo experiments at Ranchi.—With the approval of the Commissioner of Chota Nagpur, and at the expense of this Department, Mr. A. Cooke, Manager of a tea garden at Palandu near Ranchi, has been making experiments since 1893 in cultivating fodder plants, and in storing grass in silos. The result of Mr. Cooke's first experiments was reported in May 1894. This was his first attempt, and from his report it showed that his silo experiment was a success, but his experiments with fodder plants did not give very good results.

In his silo pit the following fodder plants were put:—

75½	maunds of	half ripe rice.
16½	„	millet (Gundli).
7	„	rahar dál.
13½	„	guinea-grass.
84	„	common grass.

The silo was closed on the 19th August 1893 and opened on the 20th February 1894, when the fodder grasses were found to be in excellent preservation and were readily eaten without salt by the cattle.

The following kinds of fodder plants were cultivated by Mr. Cooke:—

Lathyrus Sylvestris, Tagosaste (Cystisus Proliferus), Spanish gram, Sorghum, and Reana.

In 1895, Mr. Cooke made a *kacha* brick silo 20 feet × 4 feet in three compartments, increased the area of guinea-grass to 1 acre during the last rains, and stored about 120 maunds of grass. This experiment, Mr. Cooke reports, proved a failure, and he attributes this want of success to the fact that he stored only small quantities of grass at a time, and also kept his silo unweighted on different occasions for several weeks. Mr. Cooke is of opinion that a pit to hold 100 maunds should be stacked and covered not later than 20 days after stacking.

Yield of Crops in Jail Gardens.

28. A report on the result of the crop-cutting experiments made in jail gardens during the year 1894-95 has been separately submitted to Government with this Department's letter No. 619, dated 23rd April 1896.

During the year, the rules for the conduct of crop-cutting experiments in jail gardens were revised, and the revised rules circulated.

Crop-cutting Experiments by District Officers and Settlement Officers.

29. Returns of crop-cuttings from all District Officers and from the Settlement Officers of Orissa for the year ending the 31st May 1895, chiefly of rice, wheat, rapeseed, and mustard, have been received and are now being compiled.

The returns for the year ending the 31st May 1896 are now being received from District Officers. The first quinquennial return will be due next year (1897) to the Government of India.

Agricultural Implements.

30. *The Sibpur plough.*—The following reports have been received concerning the Sibpur plough. Mr. J. Crowdy, of Darbhanga, who has in

previous years given a favourable opinion on this plough, now reports that he does not find the Sibpur plough as good as the Hindustan plough. Mr. Pal Chaudhuri, of the Nadia district, who was supplied with six Sibpur ploughs from this Department, reports that they have been worked most satisfactorily in his farm at Natuda. He finds the plough much more useful and much less costly than the indigenous native plough, the latter doing less than half the work in the same time. He has found the Sibpur plough useful in fallow lands, and for clearing the soil of grasses and weeds. Another advantage in the plough, he states, is that it does not require frequent repairs.

The Sibpur plough experimented with on the Dighapatia estate is reported by the Manager to be too heavy for the ordinary country bullocks.

The Survey Commissioner and Director of Land Records and Agriculture, Bombay, sends the following report:—"The Sibpur plough is too light and too frail an implement to be successfully used on the deep black soils anywhere in the Presidency, and on lighter soil the indigenous plough does quite as good work, except, perhaps, in Gujrat. There, the ordinary country plough is more or less a toy, but it is satisfactory to note that this inferior implement is giving place, in the more advanced districts, to a heavier, more effective plough of purely indigenous pattern, in comparison with which the Sibpur plough would have no choice."

The Deputy Collector of Broach, who had the Sibpur plough tested in the presence of a number of land holders and cultivators, states that, although it is admitted that it opens up a given area of land in a shorter time and at a greater depth than the local plough, it is not popular with the ploughmen on account of its greater draught, which he adds, however, is not found too much for the strong breed of bullocks in Broach. Owing to this prejudice, he gives up all hope of popularizing the plough in the near future.

Two Sibpur ploughs were supplied during the year to Babu Gopi Nath Dutt of Bhawanipur, who reports that the ploughs worked satisfactorily. They were easily drawn by ordinary country bullocks, and were found very useful in breaking up hard, fallow lands. Babu Gauri Sankar Ray, of Cuttack, reports that the Sibpur plough supplied to him is working satisfactorily as before. This year especially the plough was found of great service in breaking up hard soil, where the ordinary country plough could not be driven for want of moisture. During the year under report Sibpur ploughs were also supplied to Babu Radha Gobinda Chaudhuri, a pleader in Ranchi, and to Babu Trailakya Nath Chatterji. The former reports that the plough was worked in his farm with such satisfactory results that many persons have been enquiring about its price, with a view to purchase some for their own use. The latter reports that for paddy land the Sibpur plough was found to be very useful, and that three ploughings with the Sibpur plough were equal to five ploughings with the country plough. Sibpur ploughs are also reported to have worked well in the Maldwar Ward's Estate in Dinajpur.

31. *The Baldeo plough.*—This plough has been experimented with in two districts, but is reported to be too heavy for the country cattle.

32. In consequence of these more or less unfavourable reports on the two ploughs which have been tried by this Department, further experiments are to be made with other ploughs during the current year.

33. *Sugarcane mills.*—The Behia sugarcane mills and various close imitations of them are now in use all over Bengal, and have everywhere proved a great improvement on the old wooden country mills.

34. *Experiments with cream separators at Mungpu.*—At the request of Dr. G. King, Superintendent of the Royal Botanical Gardens, Sibpur, a cream separator was sent during the year under report to Mr. A. C. Hartless, of the Government Cinchona Plantation at Mungpu, in order to afford encouragement to the improvement of the butter-supply in Darjeeling. It was worked by Mr. Hartless for some time, and then made over to an association of *raiyats*, who have since been using it. It is reported that the butter made from the cream separated by this machine is chiefly sold at Kurseong, the nearest mart. A portion of the butter finds a sale in Darjeeling. For 2 or 3 months, some of it was also sent to Calcutta. The butter is said to have been much appreciated both in Darjeeling and Kurseong.

EXPERIMENTS MADE BY THE AGRI-HORTICULTURAL SOCIETY OF INDIA.

35. The following report has been received from the Secretary to the Agri-Horticultural Society on some of the experiments made during the year with fodder, economic and fibre plants, and with manures:—

Fodder Experiments.

"*Lathyrus Sylvestris.*—Mr. A. Cooke, of Ranchi, reports a few of his plants are alive; no reports from any one else to hand.

Cicer arietinum.—The results of experiments with Spanish gram are more disappointing than reported last year, the yield in quality and quantity being equal to indigenous varieties.

Reana luxurians-Teosinte.—Large quantities of seed were distributed last year. The cultivation of Teosinte has extended greatly, but no reports of experiments are to hand, beyond expressions of satisfaction with the crops.

Cystisus proliferus albus-Tagosaste.—Mr. A. Cooke, of Ranchi, is the only member who reports on this. He states only a few plants are alive.

Guinea-grass.—Sets and seeds were greatly in demand last year.

Polygonum sachalinense, Sacaline.—In spite of the glowing accounts as to the vigorous growth and hardiness of this plant in cold and hot localities, and on all manner of soils, the plants now on hand are no larger than when the last report was issued; nor does the growth appear to be vigorous at any time of the year. On the approach of the cold weather, these stems died down entirely, and fresh growth started in March.

Lucerne Trifolium incarnatum—Crimson Clover.—The demand for seed increases yearly. A quantity of seed was imported last year for distribution, but no reports have been submitted. It is reported to be now extensively sown in the Southern States of America.

Lespediza striata—Japan clover.—At the request of a Government official in the Central Provinces, seed of this fodder plant was imported last season, but no report has been received.

Swedes Ruta Bagas.—The Manager, Kajha indigo concern, is the only one who reports in this section. Four besiras of land yielded 8 maunds of roots. The outturn would, no doubt, have been larger had the season been favourable.

Seeds of *Poa arachnifera* (*Texas blue grass*), *Japanese and silver hull buckwheat, atriplex numularia, &c.*, were also distributed, but no reports are to hand.

Economic and Fibre Experiments.

Cola acuminata (*cola* nut).—The demand for this has been fairly heavy, and a large number of plants were sent out.

Seeds of *Cœsalpina coriaria, Sweetenia mahogani. S. macrophylla*, and other forest trees, &c., were distributed in quantity last year.

Agave Americana, var. Sisalana.—No applications for plants were received.

Agave Americana, Bœhmeria nevea.—There appears to be a large demand for these fibres, and some large shipments are reported, the former at £20 per ton and the latter at £45 to £50 per ton.

Adhatoda vasica.—No further experiments were conducted by the Society, nor have any reports been received from elsewhere.

Eucalyptus.—A successful sowing was made of *E. citridora, E. globulus and E. resinifera* in the open, while the seeds sown in seed pans "damped off" considerably. My notes, printed in the October-December Journal, have caused several planters to think of taking up Eucalyptus culture.

Elætaria cardamomum.—There is an increasing demand for roots and seeds.

Tobacco.—As usual no good, or even fair samples have been received.

Cotton.—Seeds of Sea island, upland, and Egyptian long staple were distributed, but no reports are to hand as to quantity raised. A few samples of Sea island and Egyptian long staple were received and forwarded for opinion, which was not at all favourable.

Potatoes.—The demand for Naini Tal potatoes is steadily increasing; 700 maunds were indented for last year. Australian potatoes again failed to produce a fair crop.

Distribution of seed.—Seeds of the following kinds were distributed to applicants. Indian corn (American), early Cory, *ne plus ultra*, Golden Dent, Snowflake, Mastodon Dent, wheat (American) two varieties, barley (American) two varieties, Italian (one variety); field carrots, beet, orange globe, golden globe, mangel.

Manures.

Bone-meal.—Bone-meal was used in the horticultural section with great success.

The thanks of this Department are again due to the Society for the cordial co-operation and ready aid which has been rendered to us on several occasions during the year.

CHAPTER V.

Bengal Veterinary Department—Cattle-breeding.

36. The work of the Bengal Veterinary Department has been separately reported upon by Veterinary Captain Gunn, Superintendent of the Bengal Veterinary Institution, and his report has been submitted with a review to Government, with this office letter No. 1199A, dated 31st July 1896. The only veterinary subject that has not been fully dealt with in that report is that of cattle-breeding, and some account of the operations of the Department in this respect is given below.

37. *Cattle-breeding.*—During the year under report, the Superintendent of the Civil Veterinary Department, Bengal, obtained seventeen Brahmini bulls from Bihar for the purpose of improving the breed of cattle in Bengal. Two of these were supplied to the Chitpur Municipality, two to the Collector of Birbhum, two to the District Board of Khulna, one to the Burdwan Experimental Farm, one to the General Manager, Ward's Estate, Chittagong, and one to a zamindar of Basanti. Three bulls were let loose among the cows at Dum-Dum and Baraset, and five remain to be distributed.

Captain Gunn is of opinion that these Brahmini bulls, although comparatively small, are of good physique and capable of much endurance, and are better suited for mating with Bengal cows than sires of a larger breed. The Collector of Birbhum, however, reports that although several cows have been covered by the two Brahmini bulls supplied to him, no real improvement has been effected in the local breed of cattle, as the bulls themselves are small, and not in any way superior to many of the cattle of Birbhum. Mr. Banerjei, Assistant Director of this Department, states that the villagers of Burdwan consider the bull stationed on the Experimental Farm to be too small for their cows. It is too early yet, however, to draw any conclusions from the experiments made, and further reports will be awaited.

A Patna cross-breed bull was purchased by this Department during the year, and made over to Mr. C. Fox of the Kutteea factory in Shahabad for breeding purposes. Mr. Fox reports that although he himself is satified with the bull, his colour, size and appearance do not commend him to the *raiyats* who will not bring their cows to him. On the recommendation of Veterinary-Captain Gunn, the bull has been sold to Mr. Fox, who proposes to use the animal for his own cows, and to lend its services also to any cultivator who may ask for them.

The following information has been obtained from reports received from officers supplied with bulls in previous years:—The Hissar bull stationed at the Krishnagar Jail, as reported last year, is gradually losing its breeding power on account of old age. Its stock has, however, been good. The Hissar bull in the Comilla Jail is said to have improved the local breed of cattle. The stock of the Hissar bull at the Bhagalpur Jail dairy is reported to be very good, but the bull does not appear to be much appreciated outside the jail. Although its services are given without charging any fee, the Superintendent of the Jail reports that only nine outside cows were served by the bull. The English bull at Arrah and the two Hissar bulls maintained in the Government estates at Nasriganj and Buxar have continued to be useful. They were largely used by Government *raiyats* and private zamindars. The Sub-divisional Officer of Sasaram reports again this year that the progeny of the Hissar bull at Nasriganj commands higher prices than that of ordinary bulls. At Arrah, 35 cows were covered by the English bull. Eight calves were got, which are said to be very fine animals and to resemble in appearance their English sire. The bull unfortunately fell into a well and died in November last A Hissar bull was maintained by Government during the year at Buxar. This bull is reported to have greatly improved the local breed of cattle. The Sub-divisional Officer of Buxar states that owners of cows from across the river and from distant villages bring their cows to be covered by this animal, and that the calves produced fetch about Rs. 40 when they are only about 7 or 8 months old. The Bachour bull in Mynaguri is again reported to have been of very little use in improving the local breed of cattle. The Burman bull at Mymensingh has been of no use during the year. The bull of the same breed at

Tippera died in January last. Twenty-six cows have been served by this animal, and only one calf has been given birth to up to the present, which is said to resemble its sire closely.

The experiment at Bettiah to improve the local breed of cattle by mating with a Nellore bull has given good results. About half a dozen calves have already been born, showing, without exception, much improvement in the breed of their mothers. The Manager, Mr. Lowis, is keeping all the bull-calves for breeding purposes, intending, when the supply is sufficient, to distribute them over the district.

The Bankipur bull, supplied to the Chairman of the Hooghly Municipality in 1894-95, has not been of any use during the year. It is reported by the Chairman, that the people do not resort to this bull for breeding purposes, and that in fact the animal does not appear to be a good one for breeding. The Superintendent of the Civil Veterinary Department, Bengal, has been asked to report on this point.

The Bankipur bull at the Jessore Jail has been of very little use, covering only four jail cows during the year.

CHAPTER VI.

AGRICULTURAL STATISTICS.

38. The following forecasts of harvests, special reports of crops, and other agricultural statistics were prepared and published by this Department during the year:—

(1) Forecasts of the outturn of *rabi* crops of 1894-95 and of important special crops, viz., sugarcane, tobacco, mulberry, and poppy.

(2) Preliminary and final report of the *bhadoi* crops of 1895.

(3) Preliminary and final estimates of the winter rice crop of 1895.

(4) A final estimate of the wheat crop of 1895, and a first forecast of the outturn of the wheat crop of 1896.

(5) Preliminary and final forecasts of the jute crop of 1895.

(6) A final forecast of the oil-seed crops of 1894-95, and a first forecast of the oil-seed crops of 1895-96.

(7) Reports on the early and late cotton crops of 1895-96.

(8) Statistics of the production and value of mineral gems during the year 1895.

(9) A list of agricultural implements and machines which were tested during the year 1895, and of those in use which were reported to have met with more or less marked success during the year.

(10) Tables of agricultural statistics for 1894-95.

CHAPTER VII.

MISCELLANEOUS.

39. *Applications for patents for inventions.*—Eighteen applications for patents of an agricultural character were received during the year under review from the Government of India, in the Revenue and Agricultural Department, for report. The patents applied for were connected with the extraction of oil, flour, and fibres, the cleaning of fibres, improvements in tools, implements, machines, &c., and the applications were sent to the Secretary to the Agri-Horticultural Society of India, who obtained the opinion of Mr. H. J. K. Green, Member of the Institute of Civil Engineers, upon them.

40. *Agricultural Exhibitions.*—Agricultural Exhibitions were held during the year under report at Cossipore, Hatchapra in Nadia, Barhampur in Shahabad, Sonepur, Sitamarhi in Muzaffarpur, Kalimpong, Alipur and Falakata in Jalpaiguri, Tintanga in Bhagalpur, and Jajpur in Orissa. Of these, the Exhibitions mentioned in the margin were assisted with the grants of money noted respectively against them, out of this Department's allotments for public Exhibitions and Fairs. The other Exhibitions did not receive any Government subsidy. A brief notice of each of these Exhibitions and Fairs is given below.

	Rs.
Cossipore	250
Nadia	250
Barhampur	150
Sonepur	125
Sitamarhi	200
Kalimpong	500
Alipur and Falakata ...	500

The Cossipore Exhibition, which was held for the seventh time in February 1896, was visited by a large number of people from Calcutta and the neighbourhood, but the number of cultivators who came to it was limited,

It comprised exhibits in floriculture, horticulture, and agriculture. The show is mainly one for flowers and vegetables, and small attention was paid to the Agricultural Section, the exhibits being few in number and attracting little notice. Prizes were offered by this Department for cattle and ponies, sugar, dairy-produce, and for novel and useful agricultural appliances. Besides exhibits from the Experimental Farms at Sibpur, Burdwan and Dumraon, comprising potatoes, *gur*, sugarcane, tobacco plants, cotton, jute, and indigenous and foreign agricultural implements, various agricultural implements and machines were exhibited at the Show by the Department, and demonstrations were made of the method of manufacturing butter by means of the centrifugal cream-separator and European churn, of crushing sugarcane with Thomson's and Mylne's latest improved mills, of making jaggery (*gur*) in shallow pans as recommended by Messrs. Thomson and Mylne of Bihar, and of making sugar by means of the sugar-turbine without the use of bones. All these processes were watched with much interest by a number of visitors. Pamphlets and reports prepared by the Assistant Directors, both in English and in the vernacular, on agricultural subjects, were largely distributed to interested visitors.

The Kalimpong Exhibition in the Darjeeling district, which is mainly an exhibition of live-stock, was held last November and was attended by Veterinary-Captain Gunn, Superintendent of the Civil Veterinary Department, Bengal, who helped the Commissariat Department in the purchase of mules for Government. Veterinary-Captain Gunn reckons that about 236 mules were brought to the Fair from Thibet for sale, a smaller number than in the previous year. The Transport Department purchased 175 mules, against 171 in the preceding year. Veterinary-Captain Gunn considers that the animals purchased this year were of a better stamp than those purchased in the previous year. He speaks well of the Thibetan mules as being of good, hardy constitution, and states that he was particularly struck with the remarkable soundness of their limbs, and he is strongly of opinion that the Fair should be regularly subsidised and encouraged, as its development would be a source of much benefit to the Army Transport Department. There were 48 Bhutia ponies brought in for sale, and these were reported to have been of a very good stamp. Cattle were more largely represented this year than in the previous year, but Veterinary-Captain Gunn thinks there is still much room for improvement in this section both in point of numbers and quality.

The Barhampur Agricultural Show in the Shahabad district was held for the third time on the 11th and 12th February 1896 during the *Falguni mêla*, when a very large number of cattle and horses are brought for sale, attracting a large number of people from the neighbouring country. The Agricultural Show itself was arranged by a Committee of Management, under the presidency of Mr. C. R. Marindin, C.S., Magistrate and Collector of Shahabad. It was divided into four sections, comprising exhibits of cattle, agricultural produce, vegetables, fruits and flowers, and agricultural implements. Veterinary-Captain Gunn, Superintendent of the Civil Veterinary Department, and Mr. N. N. Banerjei, Assistant Director, attended the Show. Veterinary-Captain Gunn reports that the total number of cattle, ponies and horses, as registered by the admission tickets, were as follows:—

18,473 cattle.	1,338 ponies.	1,058 horses.

Outside the enclosure and round about the Fair, it was estimated that there were about 15,000 cattle and 1,000 buffaloes. Veterinary-Captain Gunn remarks that the horses collected, though a great improvement on those brought there in the previous year, were a thoroughly useless, weedy lot of creatures, and were probably the refuse from up-country Fairs. The ponies were quite as ill-shapen as the horses. The cattle, however, were of a good, useful stamp, though small in size, and were largely purchased by dealers from Lower Bengal for cart work. A large number of good animals were brought forward for competition, showing a distinct advance on last year, when the people were unwilling to have their animals judged. Sheep and goats were poorly represented, but the number exceeded that of last year, and it is anticipated that there will be a greater number next year. In the agricultural section, the exhibits consisted of specimens of rice, wheat, barley, oats, Indian corn, millets, pulses, oilseeds, country and English vegetables, and a few specimens of *gur*, sugarcane, tobacco, fibres, and some implements. The specimens were, on the whole, fair; but,

with the exception of some samples of sugarcane, they were merely specimens of ordinary produce, and not always those of the best kind. A collection of garden tools and implements was sent last year by Messrs. T. E. Thomson and Company of Calcutta. These were purchased by the Dumraon Raj, and were on show this year. The usual assortment of implements and machines were exhibited by this Department, consisting, among others, of a centrifugal cream-separator, a sugar-turbine, a chaff-cutter, and a maize-huller.

The Fair at Tintanga, in the Bhagalpur district, was held from the 30th January to the 1st February 1896. The arrangements for the Fair were supervised by a Committee, under the direction of Mr. Mullick, Joint-Magistrate. This Department sent up agricultural products, and agricultural leaflets and reports to the Fair, some of the latter of which were distributed and sold to visitors. It is reported that more than 20,000 persons were present. Local and foreign products were exhibited. A few head of cattle were also brought to the Fair.

The Sonepur Fair is the most important Fair in these Provinces for the exhibition and sale of live-stock. It was held last year from the 29th October to the 7th November 1895, and was attended by Veterinary-Captain Gunn. He estimates that there were 4,596 horses and ponies, 115 camels, 1,164 elephants, and about 30,000 head of cattle present at the Fair. The horses, though well represented in number, did not appear to Captain Gunn to be generally suitable as remounts for the Bengal Cavalry. The ponies, on the other hand, were of a good stamp and were bought up largely by dealers for the Calcutta market. Captain Gunn speaks well of the bullocks that were brought to the Fair, especially of the Sitamarhi breed, and he states that the Punjabi buffalo-cows were the finest that he had ever seen. The average height of these buffalo-cows were 5 feet 5½ inches at the withers, with a girth of 102 inches round the abdomen. There were a large number of cows brought to the Fair, but it is reported that they were not of a good class. The majority of them were very poor and were not capable of giving more than one and-a-half to two seers of milk, the best milkers being those known as the Patna cross breed. Prizes were awarded for cattle only, instead of for horses, as it had been found in previous years that horse-dealers did not care to bring forward their animals for competition. The Fair was largely attended, and was a success.

As stated in last year's report, the Alipur and Falakata Fairs are intended to give an impetus to trade in general, and to trade between Bhutan and British territory in particular. They appear to have been fairly successful in this respect, but they cannot be considered as of agricultural interest, and the grant of Rs. 500 given by the Department to them does not appear to have been utilized for the improvement of agriculture, or any objects tending in that direction. The question whether this Department should be called upon to contribute to their support in future is under consideration.

An Agricultural and Industrial Exhibition was held at Hatchapra, in the Nadia district, from the 30th December 1895 to the 4th of January 1896. The Managing Committee consisted of 2 European Missionaries and several leading Bengali gentlemen. Mr. N. G. Mukerji, Assistant Director of this Department, who attended this Exhibition, reports that it was a good exhibition, in which a large number of actual cultivators took keen interest both as exhibitors and spectators, and were very keen to obtain prizes. The display of poultry was specially good. The vegetables, including English vegetables, chillies and brinjals, were also good. The yams were magnificent, some exceeding 4 feet in length. Very small quantities of grains and growing crops were exhibited. The cattle were poor, but the sheep very good. A simple device for making ropes, and another for winding or milling thread, attracted considerable notice. Last year, there were about 300 exhibits; this year the number was over 600, of which 331 were of a purely agricultural character.

The Sitamarhi *mêla* in the district of Muzaffarpur was held in March 1896. This *mêla*, which has always been noted for its large collection of cattle, was this year made more attractive by the award of prizes for the best animals. Veterinary-Captain Gunn, who was present at the *mêla*, reports that a large number of people attended, and that about 150,000 head of cattle were collected at the *mêla*. The number of entries in the competition for prizes was large, and some of the draft-bullocks are reported to have been quite suitable to the

requirements of a heavy battery. The Show appears to have been altogether a great success and to be deserving of support.

A Show of agricultural and industrial articles was held for the first time at Jajpur in Orissa during the second week of March 1896, in connection with the celebration of the *Baruni* festival. It is estimated that about 100,000 persons visited the Show during the fortnight it was kept open. The management was in the hands of a Committee, which consisted of local zamindars, merchants, and officials. The two Travelling Overseers of this Department attended the Show, and exhibited various agricultural implements and machines, and some agricultural products. From an agricultural point of view, however, the exhibition appears to have been only moderately successful, but it is said that the exhibits from this Department attracted considerable notice. The cultivators, who were present, were satisfied with the working of the Sibpur plough, and the members of the Committee decided to purchase a Sibpur plough from the funds of the Show, in order to promote its introduction among the *raiyats*.

SUPPLY OF SEEDS, IMPLEMENTS, AND MANURES.

41. Seeds, implements, and manures were distributed by the Department to the extent noted below, during the year under report, in most cases at cost price:—

	Seeds.	Quantity.	Number of persons supplied, exclusive of the three experimental farms.
		Mds. s. ch.	
1.	Naini Tal potatoes	278 0 0 inclusive of 50 maunds distributed by the Dumraon Raj.	24 (excluding many *raiyats* of the Burdwan Raj).
2.	Muzaffarnagar wheat seed* ...	330 0 0	Distributed by the Dumraon Raj.
3.	Long-stemmed paddy ...	8 0 0	2
4.	Guinea-grass	9 20 0	8
5.	Fine paddy	5 0 0	4
6.	Jute	1 28 0	12
7.	Flax	0 24 0	2
8.	Ganja hemp	0 15 0	1
9.	Sorghum	0 13 0	4
10.	Lucerne	0 10 0	2
11.	Reana	0 10 10	5
12.	Reana luxurians		
13.	Cotton	0 4 4	8
14.	*Palam* sag	0 4 0	1
15.	*Patal* roots	0 2 8	1
16.	Indigo	0 1 8	1
17.	Sida fibre	0 0 8	1
18.	Tobacco	0 0 6	1
19.	Sugarcane cuttings	34 Kahans.	4
20.	Nepal chillies	(small quantity) Packet.	1
21.	Sutton's peas	1	1
22.	Lettuce	1	1
		Rs. a. p.	
23.	English vegetables	37 2 0 (worth)	4
24.	Rhea roots	2,500 in number	1
	Implements.	No.	
1.	Sibpur plough	18	12
2.	Behea sugarcane mill	1	1
3.	American hoe	1	1
4.	Chain pump	1	1
	Manures.	Mds.	
	Castor-cake	60	*Raiyats* of the Burdwan Raj.

* Fifty maunds of Muzaffarnagar wheat were obtained for direct distribution by this Department, but the seed was received after the sowing season and had to be sold in the local market.

42. Besides the above-mentioned articles, which were supplied to different persons, several requisitions for economic products were received during the year under report from the Reporter on Economic Products to the Government of India, which were duly attended to. An Overseer of this Department has been specially deputed to make collections for Dr. Watt, and for the Imperial Institute, London.

COST OF AGRICULTURAL EXPERIMENTS.

43. The total cost to Government of agricultural experiments and enquiries conducted under the supervision of the Department of Land Records and Agriculture during the year under report, inclusive of the cost of implements and seed grain, was Rs. 9,287-6-5, against Rs. 9,428-6-1 in the preceding year. The details are as follows:—

		Rs.	A.	P.
1.	Maintenance of the Sibpur Farm	3,311	4	11
2.	Experiments other than those made in Experimental Farms	2,268	8	3
3.	Pay and travelling allowance of Agricultural Overseers	1,239	2	6
4.	Pay of Sibpur Farm apprentice	77	1	6
5.	Cost of feeding and keeping donkey stallion at Sikkim	105	0	0
6.	Cost of exhibiting implements and machines at Agricultural Shows	514	2	6
7.	Purchase and repair of implements	1,240	12	0
8.	Purchase and freight of bulls obtained for breeding purposes	128	3	9
9.	Miscellaneous	403	3	0
	Total ...	9,287	6	5

OFFICERS OF THE DEPARTMENT.

44. Mr. W. C. Macpherson, who was in charge of the Department up to February 22nd, 1896, has left the following note on this subject:—

"Mr. Nagendra Nath Banerjei, Assistant Director, did excellent work during the year. On account of the absence on leave of Mr. Bhupal Chandra Basu, Assistant Director, who has been seriously ill, the bulk of the work of the Bengal Agricultural Department has fallen upon Mr. Banerjei, and has been done by him with much intelligence and thoroughness. Mr. Debendra Nath Mukerji acted for a short time as Assistant Director from 1st August 1895 to 5th October 1895, and Mr. Nitya Gopal Mukerji has acted for Mr. Bhupal Chandra Basu since the middle of October 1895, and has done good work."

In a separate note, Mr. Macpherson has also expressed a favourable opinion of the work done by Babu Hari Sakha Das, the statistical clerk. I would venture to endorse Mr. Macpherson's remarks as to the work done by Mr. Banerjei, and to add that Mr. N. G. Mukerji has given me much assistance in his investigation into the betel-nut plague in Backerganj, and in his superintendence of the Sibpur Farm.

I have the honour to be,

SIR,

Your most obedient servant,

P. C. LYON,

Offg. Director of the Department of Land Records and Agriculture, Bengal.

APPENDIX TO THE REPORT OF THE AGRICULTURAL DEPARTMENT FOR 1895-96.

ANNUAL REPORT OF THE SERICULTURAL EXPERIMENTS FOR THE YEAR 1895-96.

THE sericultural experiments were conducted during 1895-96 under somewhat altered arrangements. Mr. Bhupal Chandra Basu, Assistant Director of this Department, being on leave, and myself being appointed to officiate for him, the direct conduct of these experiments has been made over to the hands of three Overseers and one Travelling Overseer since the 14th October 1895, and I have exercised only a general supervision over them from my head-quarters in Calcutta, corresponding with the overseers, cocoon-rearers and others, and occasionally inspecting the nurseries in the different districts, as I did from my head-quarters at Berhampore. This altered arrangement has caused no harm to the experiments, which have been conducted quite efficiently since last October in all the stations. The season has been abnormally dry since last October, and the Overseers and the trained cocoon-rearers had to work under great disadvantage. Still it will be found from the statements given below that the work has not been allowed to deteriorate, though the demand for seed was naturally considerably less during the last six months than would have been the case had there been more rain. In the Birbhum nurseries the mulberry is so backward that it has been found impossible to do any rearing there since February. In the Garbetta nursery the condition of mulberry has been worse, but with leaf purchased from great distances, a crop was taken in February and another in March, both of which turned out, in spite of the poverty of the leaf, as fit for seed as the previous crops taken at Louhari near Garbetta.

2. The experiments were carried on during the year mainly in the following nurseries:—

(1) Berhampore and Chaltia nurseries in Murshidabad.
(2) Naodapara nursery in Rajshahi.
(3) Garhbeta and Louhari nurseries in Midnapore.
(4) Kagachira nursery in Malda.
(5) Jot and Arapur nurseries in Malda.
(6) Birampur nursery in Malda.
(7) Mehedipur nursery in Malda.
(8) Duna nursery in Birbhum.
(9) Batnagar nursery in Birbhum.

3. The stations outside the silk districts have been abandoned, so far as Departmental supervision is concerned. The Rev. A. Campbell of Pokhuria, I understand, is still carrying on sericultural operations.

Berhampore and Chaltia nurseries, Garhbeta and Louhari nurseries, and Jot and Arapur nurseries have been mentioned jointly, as in each of these cases the same set of appliances and the same persons have been employed in the conduct of the experiments in two nurseries.

4. A detailed report of the work done in each of these stations will now be given:—

BERHAMPORE AND CHALTIA NURSERIES (MURSHIDABAD).

5. These were the only nurseries that were carried on entirely with Government money. Rearing was done in the Berhampore office until a proper rearing house was built at Chaltia, which is within one mile of the Civil station. This rearing-house is more easily accessible to cocoon-rearers, and not only is the seed being more readily bought up from this nursery than from the Berhampore office, but a number of actual cultivators come to this nursery regularly for instruction, while at the Berhampore office men of the class from which clerks are recruited came as a rule for training. The following persons were in regular training at Berhampore and Chaltia during the year:—

(1) Jagesh Chandra Sanyal of Moula (near Berhampore), owner of mulberry lands.
(2) Vishnu Govind Sant } From Baroda State.
(3) Amar Singh }
(4) Gokul Chandra Sinha of Balia, near Kandi, owner of mulberry lands.
(5) Raghunath Mandal, cocoon-rearer of Balia, near Kandi.
(6) Rajkristo Das from a village near Howrah where there is cocoon-rearing.
(7) Sashi Bhusan Das, cocoon-rearer of Dangapara near Kandi.
(8) Giridhari Singh of Balia, near Kandi, owner of mulberry lands.

6. There have been several applications from men from different districts for permission for the applicants to be admitted into the Chaltia demonstration nursery for instruction. In each case the applicant has been told that he must not only find his own expenses for living at Berhampore, but he is also not to expect any help from Government when his term of instruction is over. In the case of the two Baroda men, no help from Government is needed. In the case of other men, Government help in the shape of microscopes and other special appliances is desirable. The experiments had been until recently popular only in the districts of Malda and Birbhum. The cocoon-rearers of Murshidabad have been very slow to recognise their value; but now, as there is a voluntary movement in favour of these experiments, advantage might be taken of this movement to establish three independent nurseries (such as have been established in Malda, Birbhum, Rajshahi and Midnapore) in Murshidabad—one at or near Kandi, one at Moula near Berhampore, and another near Beldanga. Government may be moved to help these trained men with microscopes and other special appliances, if they build rearing-houses themselves after the experimental plan.

7. The following table summarises the results of the experiments at Berhampore and Chaltia:—

Serial number.	Kind of cocoons reared.	Whence seed obtained.	Quantity of seed used.	Outturn.	Date of ripening.	Quantity sold for seed.	Amount realized by sale of seed.	Gross outturn.	Percentage of pebrine.	Number of cut shells (*coques ouvert*) in one tola.	Villages in which seed was used.
1	2	3	4	5	6	7	8	9	10	11	12
			Khns.	Khns.		Khns.	Rs. A. P.	Rs. A. P.	Per cent.		
1	Chhotapalu ...	Berhampore office	½	42½	27th July ...	42½	39 14 0	39 14 0	Nil	160	Andharmanik, Kagachira, Mehedipur, Jot, Birampur, Duna, Kapashdanga, Magura, Shamshapara, Naodapara.
2	Ditto ...	Ditto ...	¾	35	10th September ...	35	39 10 9	39 10 9	Nil	98	Jalalpur, Moula, Hirzapur, Poradanga.
3	Nistari ...	Ditto ...	¾	134	20th November ...	14	21 0 0	101 4 0	3	96	Kamalpur, Beldanga, Poradanga, Rajarampur, Belia.
4	Chhotapalu ...	Kagachira (sample).	1/10	2	15th December ...	2	4 0 0	4 0 0	7	142	Kalakankar (Oudh).
5	Nistari ...	Berhampore office	1/10	3	21st ,, ...	3	6 0 0	6 0 0	Nil	128	Lahore, Agra.
6	Do. ...	Ditto ...	1/10	3	3rd January ...	3	3 0 0	3 0 0	Nil	142	Balia, Boltoli, and Dangapara.
7	Chhotapalu ...	Ditto ...	1/20	1½	27th ,, ...	1½	Freely distributed to all the experimental nurseries.		3	178	
8	Nistari ...	Ditto ...	1/10	3½	16th March ...	3½	6 12 0	6 12 0	Nil	96	Kagachira.
9	Chhotapalu ...	Kagachira (sample).	1/100	¼	23rd ,, ...	¼	Kept for seed ...		7	136	
		Total ...	2⅛	225	.....	105	120 4 9	200 8 9	.....	...	

8. Since an acre of mulberry was rented at Chaltia, and a rearing house built, *i.e.*, since last July, the above crops, yielding a gross out turn of Rs. 200-8-9, were taken. Before this arrangement was made, only a few thousands of silkworms were reared each time at the Berhampore office for experimental purposes only, the resulting cocoons being distributed for seed to different nurseries. The experiments, strictly speaking, have been abandoned since last August, the result of the last of such experiments being detailed in the last part of my report, dated 14th September 1895.

9. From the above table it will be found that the principle of rearing the wrong kind of cocoons at Berhampore throughout the year was adhered to during the year under report. The right kind of cocoons to rear in the hot-weather in Bengal is the *Nistari* and in the cold-weather the *Deshi* or *Chhotapalu*. It is extremely difficult to rear the Chhotapalu successfully in the hot weather, *i.e.*, from May to September, and the rearing of this variety of silkworms is therefore hardly ever done by cocoon-rearers at this season. To keep up the seed in good condition for the other nurseries, Chhotapalu cocoons were reared at Berhampore and at Chaltia during this period. Again, very few rearers ever think of rearing the Nistari cocoons in November, the weather at this time being favourable for rearing the more delicate variety of silk-worms, viz., Chhotapalus, which are richer in silk. The November crop at Chaltia therefore consisted of Nistari cocoons. The Chaltia nursery consulted chiefly the requirements of the various experimental stations. It is the custom among cocoon-rearers (and a very good custom it is) to exchange seed, and the cocoon-rearers in the various districts, who work on the experimental method, like to get their seed from Berhampore or Chaltia, where therefore it is found necessary to rear the wrong variety of cocoons throughout the year.

10. If the statements given below are studied, it will be seen that the various demonstration nurseries were usually supplied with seed from Berhampore or Chaltia. One exception to this will also be prominently noticed. Nearly all these nurseries had recourse to ordinary village seed last November. The report had spread that the experiments would be done away with from the 1st of October 1895, and on my sudden transfer to Calcutta, it was assumed by all the experimental rearers that no Chhotapalu seed could be had at the

Berhampore office, and, according to the custom of the country, they all went with their fellow villagers in quest of Chhotapalu seed in villages. In many cases each moth examined showed corpuscles of this disease. With the exception of this momentary interruption, the experiments have gone on steadily progressing in all the stations in close association with the central demonstration nursery at Chaltia.

11. There is one more point that may be inferred from the above table. Requests for silkworm seed are often obtained from different parts of India. The table includes only three despatches of seed to other provinces—one made to Rai Radha Kishore Koul Bahadur of Lahore, another to Raja Rampal Singh of Kalakankar, Oudh, and the third to Mr. A M. Harcourt of Ghuttia, Agra. Rai Radha Kishore Koul Bahadur has employed Pundit Kalinath, one of the men trained at Berhampore, to develop sericultural industry in his zamindari. The annual silk-worm eggs raised at Kalimpong, mentioned in paragraph 5 of my report, dated the 14th September 1895, were sent to Jamail Singh and Abdus Samad, two professional cocoon-rearers of Sujanpur (in the Punjab), who have taken seed from me every year for the last four years. A few hundreds of live mulberry cocoons have been sent to other experimenters also. The above table does not include the despatches made of Eri silkworm eggs to various parties throughout India. Throughout the year a few thousands of Eri silkworms were reared at Berhampore office, chiefly with the object of supplying seed to different applicants. Mr. T. N. Mukherji, Secretary to the Indian Industrial Association, circulated all over India a pamphlet on 'Eri silk.' The result of this was about 50 applications for seed of this variety of silkworms. As no castor oil plants have been propagated for the purpose of this experiment at Berhampore, these worms have been reared every time for the last three years with leaf picked from stray trees. The applications have been thus gradually met. The outcome of this experiment so far seems to be the establishment of Eri silk-rearing on a fairly large scale in two places. Messrs. Dwarka Das, Raghunath Das of Benares have employed one of my trained men in their zamindari to introduce Eri silk-rearing and spinning of Eri cocoons among the peasantry. This experiment promises success. The other encouraging report comes from Madras from Mr. P. W. Pulicoden, who writes in his letter, dated the 1st February 1896: "The silkworms you very kindly sent me a year ago, while I was in Calicut, are thriving admirably well: I reared them according to the directions given in the article written by you. I also gave some to my friends and relations, and all the worms without exception are thriving well and they have not suffered from any disease. There is every chance of the silk-rearing growing into a regular industry in Calicut, Malabar; but I am not aware of any market where I can dispose of the Eri silk." In introducing mulberry silk-rearing also into new localities, the same difficulty about want of a market for the raw produce has been invariably felt. Mr. Harcourt of Ghuttia, Agra, writing on the 22nd April, says:—"So far we have been very successful with our experiment, and are convinced that the climate of this place is decidedly favourable to silkworm rearing. The most difficult obstacle with which we are confronted at present is the reeling of cocoons. We would prefer to do without the reeling unless there is some simple and easy method of doing it."

12. The result obtained by villagers by the use of the seed of mulberry silkworms sold from the Chaltia nursery was invariably successful. It is curious, however, that some Chhotapalu seed that remained over, and could not be disposed of by sale, and which was given away gratis to a number of rearers last August, gave, or was reported to have given, very poor result. This failure could be explained in various ways. The rearers getting the seed gratis, probably considered it safest to report failure, to avoid all future possibility of a demand for payment; or they probably had not proper arrangements for rearing Chhotopalus in September, and reared the worms because they got the seed gratis, and actually did fail; or they might have thrown away the worms for want of leaf and then reported failure from disease. This was not the first year that failure was reported in the case of seed given away free. Free distribution of seed has been now strictly prohibited as being worse than useless.

Naodapara Nursery (Rajshahi).

13. This nursery was established last August at a distance of about 3 miles north of Rampur Boalia close to Nahatta road. The house and mulberry garden have been provided by a professional cocoon-rearer, Rahamatullah Mollah, while all the special appliances have been provided by this Department. An Overseer of the Department has been stationed at Naodapara to instruct rearers in scientific methods of sericulture, and demonstrate their value at Rahamatullah's house, which he has built on the method recommended. The following persons besides Rahamatullah have been attending the overseer's instructions at Naodapara:—

(1) Ashgar Sirkar of Bhogrol.	(4) Zamiruddin Mollah of Naodapara.
(2) Abdul Ali Mollah of „	(5) Reazuddin Mallik of „
(3) Sherazali Mollah of „	(6) Abdul Sobhan of „

(7) Purna Chandra Mandal of Baya.

14. The Overseer goes to Bhogrol and Baya every now and again, specially to organise protective measures when muscardine breaks out. The cocoon-rearers of Naodapara, Baya and Bhogrol are now convinced that in sulphur fumigation they have a simple and certain

remedy against this dread epidemic. Babu Udaynarain Bhaduri of Shapura (2 miles north of Rampur Boalia), a local zamindar, is very much interested in successful results of the experiments obtained at Naodapara, and he is anxious to start a school in his house where sericulture will be daily taught to children. Babu Taran Chandra Bhoumic of Rampur Boalia, another local zamindar, has also interested himself in the experiments, and it is at his instance that the three Bhogrol men come to Naodapara for instruction. Naodapara being so close to Rampur Boalia, the experiments have attracted the attention of the local agents of the more important zamindars also, viz., the Rajas of Natore and Tahirpur. There is some prospect of Raja Shashishekhareshwar Roy establishing a demonstration nursery at Tahirpur, adjoining the school-house during the current year. The seed sold from the Naodapara nursery has given good result in every case, and the use of sulphur and of sulphate of copper also is getting gradually popular among the cocoon-rearers of Naodapara and the neighbouring villages. Rahamatullah has hitherto had only 2 bighas of mulberry. This month he has acquired another bigha of mulberry land. The results embodied in the following table have been obtained in 8 months from only 2 bighas of mulberry :—

Serial number.	Kind of cocoons reared.	Whence seed obtained.	Quantity of seed used.	Outturn.	Date of ripening.	Quantity sold for seed.	Amount realized by sale of seed.	Gross outturn.	Percentage of pebrine.	Number of cutchellis (*cognes soieuse*) in one tola.	Villages in which seed was used.
1	2	3	4	5	6	7	8	9	10	11	12
			Khns.	Khns.		Khns.	Rs. A. P.		Per cent.		
1	Chhotapalu ...	Chaltia Nursery...	½	20	7th September ...	.....	.....	19 0 0	2	136	Not sold for seed.
2	Ditto ...	Ditto ...	½	8	23rd October ...	8	6 8 0	6 8 0	10	124	Baragachi.
3	Ditto ...	Village ...	½	23	11th December ...	.....	.....	20 2 0	60	140	Not sold for seed.
4	Nistari ...	Ditto ...	½	35	17th February ...	35	35 0 0	35 0 0	7	144	Baragachi, Baya, Maharajpur.
5	Do. ...	Chaltia Nursery...	½	67	27th March ...	67	50 0 0	50 0 0	Nil	142	Naodapara, Baya, Bhugrail, Baragachi.
		Total ...	2	153	.....	110	91 8 0	130 10 0			

Louhari and Garhbeta Nurseries (Midnapur).

15. Cocoon-rearing on improved methods began to be demonstrated in the district of Midnapur last June, in the house of Sriram Chandra Ray, an inhabitant of Louhari, which is about five miles from Garhbeta. This man had seen the improved methods of sericulture at Pakhuria in Manbhum, and he was anxious to introduce them in his own village. He got very good result at Louhari; but Louhari being out of the way, and not so easily accessible to cocoon-rearers, he was induced to remove to Garhbeta. But as he had already built a rearing-house and planted mulberry at Louhari, a rearing-house had to be built and a mulberry plantation made for him at Garhbeta. Arrangements are likely to be made to carry on the Louhari and Garhbeta nurseries separately, but hitherto it has been found feasible to work only at one centre, first at Louhari and then at Garhbeta. Since January, work has been going on at Garhbeta nursery, and the overseer has been able to attract a number of cocoon-rearers from the neighbouring villages to come to him for instruction. The following persons besides Sriram Chandra Ray are in regular training at the Garhbeta nursery :—

(1) Prasanna K. Datta of Louhari.
(2) Baroda Pr. Ray of do.
(3) Bhairab Buria of Garhbeta.
(4) Paran Gazi of Garhbeta.
(5) Kunja Pal of ditto.
(6) Jagu Dalal of Nipina.
(7) Rahmat Dalal of Nipina.

Of these, Jagu Dalal has just finished building a very large rearing-house (30 cubits × 13 cubits) on the plan recommended to him. The help proposed to be rendered to him will be in the shape of 100 pieces of cleaning nets, 10 yards of galvanised wire-netting, and 100 glass panes, to enable him to carry on the experimental plan of work, and he will be also allowed to use the microscope and the spraying machine belonging to the Garhbeta nursery.

16. The seed sold from these nurseries has given very satisfactory result, except only in one instance. During my last inspection of the nurseries, I enquired of the cause of this failure. The man who had failed admitted that the failure took place owing to his own fault, as he had reared in the same room worms from some ordinary village seed which had died before the worms from the experimental seed began to die. It was therefore clearly a case of infection, and it has not deterred this same man from going in for experimental seed every time since this happened. At Nipina and Punishol, cocoon-rearers are using sulphur in fumigating their houses before each rearing. The mulberry plantation at Garhbeta has not been properly established yet on account of the drought that has prevailed since the cuttings were planted in September. The mulberry had therefore to be obtained from Sriram Babu's

garden at Louhari, which is one acre in extent, and some had to be bought last February. The results obtained at Louhari and Garhbeta are summarised in the following table:—

Serial number.	Kind of cocoons reared.	Whence seed obtained.	Quantity of seed used.	Outturn.	Date of ripening.	Quantity sold for seed.	Amount realized by sale of seeds.	Gross outturn.	Percentage of pebrine.	Number of cut shells (*coques sotiées*), in one tola.	Villages in which seed was used.
1	2	3	4	5	6	7	8	9	10	11	12
1	Nistari	Duna nursery ...	Khns. ¼	Khns. 14	20th July ...	Khns. 8½	Rs. A. P. 14 0 0	Rs. A. P. 20 0 0	Per cent. 5	88	Benachapra, Akeria, Rajpur, Nipina, Chandabila, Uparshol.
2	Do.	Previous crop ...	1	100	5th August ...	60	119 10 0	159 13 0	½	88	Akeria, Nipina, Punishol, Benachapra, Chotea Kanda, Agora.
3	Do.	Chaltia nursery ...	½	30	8th November ...	19½	39 0 0	49 8 0	2	136	Benachapra, Chandabila, Nipina, Sorboni, Punishol.
4	Do.	Ditto ...	¾	70	3rd February ...	50	50 0 0	66 0 0	3	136	Nipina, Akeria, Sorboni, Upershol, Moheshpur, Krishnagar, Benachapra.
5	Do.	Ditto ...	½	30	27th March ...	19½	27 0 0	34 0 0	Nil	.....	Moheshpur, Krishnagar, Benachapra.
			2½	244	.....	103½	249 10 0	329 5 0			

Kagachira Nursery (Malda).

17. This was the first nursery established by the independent effort of an actual cocoon-rearing cultivator, who came of his own accord from Malda for instruction at the Berhampore Laboratory, and who was provided with a microscope and other special appliances, to enable him to carry out in practice what he had learnt. He has gone on getting larger and larger results, until last year he reared more than 2,000 kahans of cocoons. The profits he has been making during the last five years, since he took to rearing silkworms on new methods, have been so great that his work has excited local jealousy and opposition, which have been of great hindrance to his work during the past year. In my last annual report about this rearer, I made the following remark:—"Three years ago he was struggling with his money-lenders, like many other silk-rearers; now he is the recognised money-lender of his village, and the most substantial cultivator in the neighbourhood." Throughout last year his work was opposed by Ramprosad Ray of Nashipur, who had been, until the last two or three years, the recognised money-lender for Kagachira and other villages close to Nashipur. He did his utmost to prevent Dandadhar from extending his mulberry plantation, and to gain his end he engaged *lathials* and excited riots. The proceedings in Court, which have already resulted in some of Ramprosad's relations and retainers being sent to jail, are still going on, and it is hoped, before long, this opposition to the experiments, from an unlooked-for quarter, will subside altogether. Ramprosad has been most assiduous in his efforts to spread false reports about failure of Dandadhar's crops, that he might not have sale for his seed. Every time I visited Malda during the year, I heard in different villages, about the failure of crops at Dandadhar's house, when the crops had actually turned out most successful. Results obtained from seed sold by Dandadhar have been invariably successful, so far as I could gather from personal enquiry at Kagachira and Jot. Owing to Ramprosad's opposition, Dandadhar was also unable to start another *grainage* at Araidanga that would have been started last October, but for this opposition on the part of Ramprosad in the matter of Dandadhar extending his mulberry plantation. The results obtained in Dandadhar's nursery, during the year, are summarised in the following table:—

Serial number.	Kind of cocoons reared.	Whence seed obtained.	Quantity of seed used.	Outturn.	Date of ripening.	Quantity sold for seed.	Amount realized by sale of seed.	Gross outturn.	Percentage of pebrine.	Number of cut shells (*coques sotiées*) in one tola.	Villages in which esed was used.
1	2	3	4	5	6	7	8	9	10	11	12
1	Nistari ...	Chaltia Nursery...	Khns. 3½	Khns. 343	30th April ...	Khns. 45	Rs. A. P. 90 0 0	Rs. A. P. 360 0 0	Per cent. 1/5	106	Kagachira, Kotwali, Kaliachak, Jagadispur, Debipur, Mirjatpur, Rajarampur Satpaisahat, Uttarpara and Domkal Azimganj.
2	Do. ...	From previous crop.	2	80	4th June ..	.....	.....	80 0 0	2	132	
3	Do. ...	Chaltia Nursery...	3	234	23rd July ...	13	26 0 0	203 0 0	8	120	Mirjatpur and Kagachira.
4	Do. ...	Previous crop ...	3	288	27th August ...	.....	.....	228 8 0	5	104	
5	Chhotapalu ...	Chaltia Nursery...	1½	50	4th September ...	3	6 0 0	45 6 0	1½	104	Kagachira.
6	Ditto ...	Ditto ...	¾	61	23rd October ...	.....	.....	60 0 0	Not examined.	126	
7	Ditto ..	Village Sunch ...	4	245	25th November ...	.....	.....	240 0 0	...	136	
8	Nistari ...	Chaltia Nursery...	3	290	31st January ...	60	113 0 0	273 0 0	Nil	142	Louhari, Agra, Kagachira, Jot, Araidanga.
9	Do. ...	Ditto ...	4	460	20th March ...	11	22 0 0	390 0 0	Nil	Not weighed.	Kagachira.
		Total ...	24½	2,051		132	257 0 0	1,879 14 0			

Jot and Arapur Nurseries (Malda).

18. Both these nurseries were conducted by Bholanath Das of Jot, independent of help from this Department. Arapur is more suitable for rearing seed than Jot, but as Bholanath lives at Jot, he finds it inconvenient to work both the nurseries at the same time. For three months Bholanath suffered from a serious illness, and he was in delicate health throughout the year, which prevented his making suitable arrangements for working both the nurseries under his supervision. The seed sold from these nurseries has given satisfactory result. At Jot, as at Kagachira, the use of sulphur and of sulphate of copper has become quite general among cocoon-rearers, and loss from muscardine has become a thing of the past in these villages. The following table summaries the results of the experiments in these nurseries:—

Serial number.	Kind of cocoons reared.	Whence seed obtained.	Quantity of seed used.	Outturn.	Date of ripening.	Quantity sold for seed.	Amount realized by sale of seed.	Gross outturn.	Percentage of pebrine.	Number of cut shells (*coques soiées*) in one tola.	Villages in which seed was used.
1	2	3	4	5	6	7	8	9	10	11	12
			Khns.	Khns.		Khns.	Rs. A. P.	Rs. A. P.	Per cent.		
1	Jot. Nistari ...	Chaltia Nursery ...	½	9	30th April ...	...	.....	8 12 0	½	112	
2	Jot. Do. ...	Village Sunch ...	5	427	21st May ...	40	35 0 0	306 0 0	.....	136	Bholahat.
3	Jot. Do. ...	Duna Nursery ...	3½	335	4th September ..	Nil	.....	256 0 0	½	88	
4	Jot. Chhotapalu	Arapur Nursery ...	1½	4	11th October ...	1	1 8 0	4 8 0	.....	104	Jot.
5	Jot. Ditto ...	Village Sunch ...	4½	234	10th December ...	Nil	.....	206 0 0	100	136	
6	Jot. Nistari ...	Kagachira Nursery.	3	520	20th March ...	Nil	.....	280 0 0	2	.....	
7	Arapur. Do. ...	Duna Nursery ...	¼	61	24th July ...	61	77 4 0	77 4 0	2½	112	Jot.
8	Arapur. Chhotapalu	Chaltia Nursery ...	1½	54½	6th September ...	54½	68 0 0	68 0 0	½	96	Mehedipur.
		Total ...	19	1,644½	.....	156½	181 12 0	1,206 4 0	.....	.....	

Birampur Nursery (Malda.)

19. This nursery was started last June by a professional cocoon-rearer of Birampur, who was given a microscope and other special appliances. He has had very good crops every time since he has been working the new methods. He has not, however, built a proper rearing house yet. He will do so next September. To provide for this extension, he has planted 8 bighas more of mulberry. Good result was obtained in every house from the use of seed from this nursery, and the use of sulphur fumigation has been also spreading at Birampur. The results of the experiments conducted in this nursery are summarised in the following table:—

Serial number.	Kind of cocoons reared.	Whence seed obtained.	Quantity of seed used.	Outturn.	Date of ripening.	Quantity sold for seed.	Amount realized by sale of seed.	Gross outturn.	Percentage of pebrine.	Number of cut shells (*coques soiées*) in one tola.	Villages in which seed was used.
1	2	3	4	5	6	7	8	9	10	11	12
			Khns.	Khns.		Khns.	Rs. A. P.	Rs. A. P.	Per cent.		
1	Nistari ...	Duna Nursery ...	1½	60	22nd July ...	7	11 0 0	60 0 0	1	96	Muthbari, Mohanpur, Syamdaspur. Birampur.
2	Do. ...	Previous crop ...	1½	130	27th August ...	20	15 0 0	97 8 0	10	96	Birampur.
3	Chhotapalu ...	Chaltia Nursery	1	64	8th September ...	3	3 0 0	56 8 0	5	...	Ditto.
4	Ditto ...	Village Sunch ...	3	239	20th December ...	Nil	.....	192 0 0	100	128	
5	Nistari ...	Ditto	2½	215	31st March ...	Nil	.....	134 0 0	1	160	
		Total ...	9½	708	.....	30	29 0 0	540 0 0	.....	.....	

Mehedipur Nursery (Malda.)

20. Very good work has been done during the past year by Naderchand Das, the proprietor of this nursery. He has not only had successful results himself, and more sale of seed than he had last year, but he has popularised the use of sulphur and sulphate of copper among several cocoon-rearers of Mehedipur, from whose houses muscardine has disappeared. His brother Dindoyal, who lives in a separate house and rears cocoons separately, also selects his seed with the microscope, and disinfects his house and appliances with the spraying machine given to Naderchand. Both brothers got equally good results last year. Two other cocoon-rearers of this village, Bhuban Mohan Das and Anadinath Mandal, are being

regularly trained by Naderchand. The latter is distantly related to Naderchand, but the former is no relation of Naderchand's. It is unusual for villagers to teach a profitable business to others, except to members of their own household, and Naderchand taking pains to teach even one stranger speaks well of him. Dandadhar of Kagachira, Bholanath of Jot, Pulin of Birampur, and Bonamali of Duna, have taught the new methods to some of their relations; the overseers of this department teach several persons as a matter of duty; but Naderchand Das of Mehedipur and Kalidas Ghose of Batnagar are the only men who teach what they have learnt in a perfectly disinterested manner. Naderchand is the Head Pandit of Mehedipur School in Malda, and Kalidas Ghose is the Head Pandit of Batnagar School in Birbhum. This fact would account for the difference in their behaviour in this respect. The results of the experiments conducted in this nursery during the past year are summarised in the following table:—

Serial number.	Kind of cocoons reared.	Whence seed obtained.	Quantity of seed used.	Outturn.	Date of ripening.	Quantity sold for seed.	Amount realized by sale of seed.	Gross outturn.	Percentage of pebrine.	Number of cut shells (*coques soiées*) in one tola.	Villages in which seed was used.
1	2	3	4	5	6	7	8	9	10	11	12
			Khns.	Khns.		Khns.	Rs. A. P.	Rs. A. P.	Per cent.		
1	Nistari ...	Previous crop ...	1	81¼	9th May ...	...	.....	63 0 0	3½	91	
2	Do. ...	Ditto ...	1½	83½	17th June ...	Nil	.....	60 0 0	1	120	
3	Do. ...	Duna Nursery ...	1½	94	23rd July ...	2½	2 8 0	44 8 0	2	120	Mehedipur.
4	Do. ...	Chaltia Nursery...	1½	120	12th September ...	Nil	.....	70 0 0	.....	.....	
5	Chhotapalu ...	Ditto ...	1½	27	7th ,, ...	Nil	.....	14 0 0	.....	.....	
6	Ditto ...	Bogra district ...	2	185	8th January ...	167	103 0 0	113 0 0	21	102	Poladanga Joar.
7	Nistari ...	Village Sunch ...	¾	86	31st March ...	30	22 8 0	43 8 0	1	160	Harirampur Joar.
		Total ...	9¾	677	.....	199½	128 0 0	408 0 0	.....	.....	

Duna Nursery (Birbhum).

21. With regard to the Duna and Batnagar nurseries in the district of Birbhum, it is to be noted that a very large proportion of the cocoons raised in them has been sold for seed. The same remark applies to the three newly established nurseries of Chaltia, Naodapara, and Garhbeta, the cocoons raised in these nurseries being so all largely bought up for seed. It is not to be inferred from this fact that the cocoons, raised in these nurseries, were more fit for seed than those raised in the Malda nurseries. The situation of a nursery is of the greatest importance in determining sale. Cocoon-rearers like to exchange seed, and they avoid, if possible, using seed raised in their own village, however healthy this seed may appear to be. Some cocoon-rearers of Kagachira, Jot, Birampur, and Mehedipur have acquired such confidence in the experimental seed, that they depart from the ordinary practice and buy seed from the experimental nurseries in these villages, instead of accompanying their fellow-villagers in search of seed in their accustomed haunts or *joars* in some other villages. But the sale in these nurseries depends mainly on outsiders happening to pass by these nurseries in search of seed at the time when the worms in them are ripening. Thus in the case of the Arapur nursery in Malda, which is situated on the roadside, both crops were entirely disposed of for seed. The results obtained at the Duna nursery are summarized in the following table:—

Serial number.	Kind of cocoons reared.	Whence seed obtained.	Quantity of seed used.	Outturn.	Date of ripening.	Quantity sold for seed.	Amount realised by sale of seed.	Gross outturn.	Percentage of pebrine.	Number of cut-shells (*coques soiées*) in one tola.	Villages in which seed was used.
1	2	3	4	5	6	7	8	9	10	11	1
			Khns.	Khns.		Khns.	Rs. A. P.	Rs. A. P.	Per cent.		
1	Nistari ...	Mehedipur nursery.	1	105½	10th May ...	82½	110 0 0	127 8 0	3½	104	Meteria, Bamanigram, Laghosa, Surjyabati, Gargora, Bhandari, Duna.
2	Do. ...	Previous crop ...	1½	120	16th June ...	120	120 0 0	120 0 0	3	132	Meteria, Birnagar, Kaliachak, Kagachira, Jot, Birampur, Mathurapur.
3	Do. ...	Dupakhuria ...	1½	107	27th July ...	107	93 0 0	93 0 0	1½	120	Jot.
4	Do. ...	Previous crop ...	¾	67	3rd September ...	Nil	.....	47 0 0	2	136	
5	Chhotapalu ...	Chaltia nursery ...	¾	51	7th ,, ...	51	75 0 0	75 0 0	5	...	Bargan, Kastur, Kumirkhala, Khorod.
6	Ditto ...	Jot nursery ...	1½	42	16th October ...	Nil	.....	28 8 0	No record		
7	Barapalu ...	Previous crop ...	½	35	13th January ...	15	15 0 0	35 0 0	Nil	128	Duna and Berhampur.
		Total ...	7	527½	.....	375½	413 0 0	536 0 0	.....	...	

Batnagar Nursery (Birbhum).

22. This nursery is also conducted by a professional cocoon-rearer, who is a fairly educated man. He has had considerable influence in improving the methods of rearing in the surrounding villages. He has taught all the new methods to Babu Dinabandhu Sinha of Shatpalsahat, a medical practitioner, who has been unremitting in his applications for a microscope, to enable him to carry on the methods he has learnt. Dinabandhu Babu has been also rearing cocoons and getting very good results; but I have not given him any encouragement to start a regular *grainage*. Kalidas Ghose was ill and in hospital at Saintha for several months during the year under report, which accounts for no rearing having been done in this nursery during those months. The results obtained in this nursery are summarized in the following table :—

Serial number.	Kind of cocoons reared.	Whence seed obtained.	Quantity of seed used.	Outturn.	Date of ripening.	Quantity sold for seed.	Amount realized by sale of seed.	Gross outturn.	Percentage of pebrine.	Number of cut shells (*coques soiuez*) in one tola.	Villages in which the seed was used.
1	2	3	4	5	6	7	8	9	10	11	12
			Khns.	Khns.		Khns.	Rs. A. P.	Rs. A. P.	Per cent.		
1	Chhotapalu ...	Chaltia nursery	1	88	27th July	38	38 0 0	63 0 0	.....	144	Dupakhuria.
2	Ditto ...	Previous crop ...	½	20½	8th September ...	20½	21 0 0	21 0 0	.....	...	Satgharia.
3	Ditto ...	Jot nursery ...	½	113	20th October ...	61	61 0 0	102 10 0	.....	124	Cocoon-rearers from different villages of Malda.
			2	221½		119½	110 0 0	186 10 0			

23. The following table gives a comparative view of the progress of the experiments in the various stations during the last two years :—

Names of nurseries.	Quantity of cocoons raised, 1894-95.	Quantity of cocoons raised, 1895-96.	Quantity of cocoons sold for seed in 1894-95.	Quantity of cocoons sold for seed in 1895-96.
1	2	3	4	5
	Khns.	Khns.	Khns.	Khns.
1 Berhampore and Chaltia	35	225	13	105
2 Naodapara	Nil	153	Nil	110
3 Garbetta and Louhari	Nil	244	Nil	103
4 Kagachira	1,675⅓	2,051	354⅓	132
5 Jot and Arapur	1,982	1,644½	82	156½
6 Birampur	Nil	708	Nil	30
7 Mehedipur	275	677	35	199½
8 Duna	395	527½	105	375½
9 Batnagar	230	221½	102	119½
10 Kalimpong	33	20	33	20
11 Pokhuria	235	102½	14	?
	4,860½	6,574	738½	1,351

24. In 1895-96 the quantity of cocoons raised in the various experimental stations amounted to 6,574 *kahans* as compared to 4,860½ *kahans* raised in the previous year. Of the 6,574 *kahans*, 1,351 *kahans* (or more than one-fifth) were sold for seed, as compared to 738½ *khanas* (or about one-seventh of the produce) sold for seed in 1894-95. There was thus improvement not only in the produce of cocoons, but in the proportion bought by cocoon-rearers for seeding. 738½ *kahans* and 1,351 *kahans* of seed cocoons represent respectively about 2,300 and 4,500 ounces of eggs. The average quantity of seed used by a rearer differs in different districts. In Malda the average quantity of seed-cocoons used by a rearer is about 2 *kahans*, in Murshidabad about ½ *kahan*, in Birbhum about 1 *kahan*, in Rajshahi about ½ *kahan*, and in Midnapore about ¼ of a *kahan*. It is difficult therefore to say how many cocoon-rearers were benefited by the 1,351 *kahans* of seed-cocoons sold from the various experimental nurseries during the year. Each *kahan* of this seed must have produced about 1½ maunds of green cocoons, or about 9 lbs. of raw silk. The *direct* result of the experiments may therefore be put down at about 12,160 lbs., or nearly a lakh of rupees-worth of raw silk. The *indirect* result of the experiments consists (1) in a considerable proportion of the second generation of seed being again used for seed purposes,

resulting in the circulation of a vast amount of healthy seed in the country, and (2) in a large number of people learning healthier methods of rearing and chiefly the means of avoiding muscardine, which is an epidemic, easily checked, though almost as destructive as pebrine.

25. The following table gives an idea of the progress of the experiments during the last five years:—

Year.	Total expenditure inclusive of my salary and travelling expenses.	Total quantity of seed sold.
1	2	3
	Rs. A. P.	Ounces.
1891-92	8,077 1 9	1,035
1892-93	8,134 2 0	1,900
1893-94	7,955 3 0	2,134
1894-95	8,259 0 6	2,388
1895-96	7,563 6 1	4,500

26. The experience of last six months, when the sericultural Overseers worked only under a general supervision of this Department, shows that the plan of work recommended in paragraph 9 of my report, dated the 14th September 1895, is feasible. If, in addition to this, some scheme is sanctioned to give effect to that portion of paragraph 2 of Government order No. 685T.R., dated 11th October 1895, which deals with the teaching of sericulture in schools, the expense in carrying on these experiments will come to only Rs. 3,000 per annum, while the benefit from them will go on steadily increasing, as they have been during the past 5 years, with the increase in the number of demonstration nurseries (by 3 every year), and also in the number of persons trained in scientific methods of sericulture in schools associated with these nurseries. The subject of the introduction of sericulture into schools is still under correspondence, and it is to be hoped that something practical will come out to perpetuate the results of the sericultural experiments which have been shown during the past 5 years to be capable of practical and profitable introduction among the cocoon-rearing cultivators of the different silk districts of Bengal. Sericulture studied by school-boys who see cocoon-rearing at or near their own villages carried on under scientific methods, is at least as much capable of giving a general culture to the mind, as the elements of physics at present studied without scientific apparatus by these school-boys. It is only by educational methods that a general resuscitation of sericulture throughout the silk districts is possible within a reasonable limit of time, and it is by such methods also that the silk industry of France and Italy has been revived. It is too readily assumed, by silk merchants and zamindars, that sericulture in Bengal is destined to die out. If they were to enquire into the present state of the industry in and around the villages where the silk experiments have been started, they would soon give up their pessimistic view, which is productive of apathy and inaction. They will find, nearly everywhere in Bengal, abandoned mulberry fields which, being too high for ordinary cultivation, are lying waste; but in and around the villages, where the silk experiments have been commenced, mulberry cultivation has been extending fast to the benefit of raiyat, zamindar and silk factor.

27. Speaking of the indirect result of the sericultural experiments, I may also mention the fact of persons trained at Berhampur doing useful work in Kashmir, in Nepaul, in the Punjab, in North-Western Provinces and in Mysore, and when the two men from Baroda; now still in training at Berhampore, will have gone back to Baroda next October, there will be centres of sericultural enterprize based on rational principles throughout the country.

NITYA GOPAL MUKERJI,

Offg. Asstt. to the Director of the Dept. of Land Records and Agriculture, Bengal.

Calcutta,
The 24th April 1896.

S. M. W.—Reg. No. 1383J—700—28 8-96.

REVENUE DEPARTMENT.

AGRICULTURE.

DARJEELING, THE 5TH OCTOBER 1896.

RESOLUTION—No. 847T.—R.

READ—

Letter No. 836A., dated the 9th September 1896, from the Board of Revenue, Land Revenue Department, submitting the Report of the Agricultural Department for the year 1895-96.

THE eleventh Annual Report of the Department of Land Records and Agriculture, on the subjects of agricultural enquiry, agricultural experiments and agricultural improvements, which was due to Government on the 15th August 1896, was not received from the Board of Revenue until the 14th September 1896. The cause of the delay has not been explained.

2. *Analysis of districts.*—Analytical Reports which were prepared some years back exist for the districts of Burdwan, Dacca, Lohardaga and Cuttack. At the suggestion of the Agricultural Conference, held in Calcutta during the last cold weather, the Lieutenant-Governor desired the Director to cause analyses of one or two additional districts to be prepared by the agency at his disposal as opportunity offered. The Board suggest that Puri and Balasore might be taken in hand, but it appears to the Lieutenant-Governor desirable not to take up districts under survey and settlement until those operations are completed and the settlement statistics are fully available.

3. *Emigration to Burma.*—During the year under report, 136 persons emigrated from Bihar to Burma, against 304 in 1894-95. No reasons have been assigned for this large decrease, and the Lieutenant-Governor desires that the Director will endeavour to ascertain the cause. The arrangements made with the British India Steam Navigation Company for the conveyance of state emigrants from Bihar, Chota Nagpur and Orissa under certain conditions, continued in force during the year. The object with which this scheme was started was to induce Bihar zamindars to take up land in Burma and settle on it Bihar cultivators in the hope that a stream of emigration to that Province might be opened out in time. It is important that the working of the scheme should be closely watched, and the causes that impede its operation be ascertained.

4. *Silk experiments.*—In October 1895 Sir Charles Elliott decided that Mr. Nitya Gopal Mukharji's services were no longer required for the sericultural experiments on which he had been employed for many years; but it was conceded that the experiments might be continued under a travelling Overseer and three Assistant Overseers, tentatively, up to 31st March 1896. These men appear to have carried on with some success the work of instructing cocoon-rearing cultivators, and the experiments have therefore been still further prolonged.

At 11 stations, 6,574 kahans (a kahan = 1,280 cocoons) of seed-cocoons were raised during the year, while the quantity sold to cultivators amounted to 1,351 kahans, or 4,500 ounces, as against 1,035, 1,900, 2,134 and 2,388 ounces sold in the four previous years. Three nurseries were established under Mr. Mukharji's supervision near Berhampur, near Rampur Boalia, and at Garhbeta, respectively, all of which are recognized centres to which cocoon-rearers go in quest of seed. At these nurseries seed is microscopically selected and is sold to the cultivators, and rational methods of feeding and cleaning are followed. The nurseries have achieved considerable success.

The total expenditure incurred on silk experiments during the year was Rs. 7,563, against Rs. 8,259 expended in the preceding year.

5. *Fungoid diseases of betel-nut palms and pán vines.*—During the year information was received of the existence of a wide-spread plague among betel-nut trees in the districts of Noakhali and Backergunge. Enquiries into the origin and cause of the plague were made by Dr. G. Watt, Reporter on Economic Products to the Government of India, and also by Dr. G. King, Superintendent

of the Royal Botanical Gardens, and Mr. N. G. Mukharji, and the subject is still under consideration. Mr. Mukharji also reported upon a fungoid epidemic, which has broken out in *pán* gardens and has seriously affected the price of *pán*.

6. *Manure and crop experiments.*—Agricultural experiments were carried on in the farms belonging to the Burdwan and Dumraon Estates, and in the Government Farm at Sibpur; also in Government, Wards' and Private Estates. At Burdwan and Dumraon much attention was bestowed on the conservation of cow-dung for manure. Samples taken from both places were analyzed, and it was found that the sample from Burdwan was by far the richer of the two in nitrogen. At Sibpur Dr. Prain made a botanical study of several species of indigenous wheat plants, and obtained information of some value which is to be published by the Department in a separate Report. At Burdwan 96 cultivators undertook the cultivation of special crops, with selected seed, under the supervision of Mr. N. N. Banerji and the Farm Overseer. The cultivation of Naini Tâl potatoes appears to have been specially successful and popular there, as well as in the Dumraon Estate. At both places the planting of sugarcane in trenches was tried with results which show, as in previous years, the advantage of this method over the ordinary one of planting in shallow furrows. In two series of plots, the trenching system gave increased profits of Rs. 32 and Rs. 58 per acre, respectively. Crop-cutting experiments were made in the Jail gardens by the District Officers and the Settlement Officers of Orissa. Among improved agricultural implements, the Sibpur and Baldeo ploughs were tried with but indifferent success. A cream-separator, which was sent up to the Government Cinchona Plantation, seems to have found favour in the Darjeeling district; the raiyats who used it are reported to have found a good market for their butter.

7. *Veterinary Institution.*—The Lieutenant-Governor has in a separate Resolution reviewed the progress made by the Veterinary Department in Bengal since its foundation; and it is unnecessary, therefore, to refer to the subject again here.

The Provincial expenditure of the Civil Veterinary Department, Bengal, during the year 1895-96, amounted to Rs. 16,946-7-2.

8. *Miscellaneous.*—The Agricultural Department prepared and published, during the year, general forecasts of *rabi*, *bhadoi*, winter rice, wheat, jute and oilseed crops; also reports on the early and late cotton crops, statistics of the production and value of mineral gems, a list of agricultural implements and machines tested or in use, and Tables of Agricultural Statistics for 1894-95. Agricultural Exhibitions were held, during the year, at Sonepur, Cossipore, Hat Chapra in Nadia, Barhampur in Shahabad, Sitamarhi in Muzaffarpur, Kalimpong, Alipur and Falakata in Jalpaiguri, Tintanga in Bhagalpur, and Jajpur in Orissa. The Exhibitions held at the eight first-named places were assisted by Government with grants of money, which were spent chiefly in prizes.

9. The total expenditure of the Department on agricultural enquiry and improvement (excluding the pay of superior establishment and the expenditure on silk experiments, and the cost of the Civil Veterinary Department) was Rs. 9,287, against Rs. 9,428 in the preceding year.

10. The time of the Director has in recent years been mainly devoted to the supervision of surveys and settlements. The work of agricultural research and agricultural improvement has on this account not received as much attention as its importance deserves. Now, however, that Settlement Officers have acquired experience, the Lieutenant-Governor hopes that the Director will be able to give more attention to agricultural research and the introduction of agricultural improvements in wards' and Government estates.

ORDER.—Ordered that the Resolution be published in the *Calcutta Gazette*, and that a copy of it, together with the Report and the forwarding letter of the Board of Revenue, be submitted to the Government of India in the Revenue and Agricultural Department, and a copy forwarded also to the Board of Revenue.

By order of the Lieutenant-Governor of Bengal,

M. FINUCANE,

Offg. Secretary to the Govt. of Bengal.

No. 4043T.—R.

COPY forwarded to the Secretary to the Board of Revenue, Land Revenue Department, for the information of the Board.

No. 4044T.—R.

COPY forwarded to the Director of the Department of Land Records and Agriculture, Bengal, for information.

No. 4045T.—R.

COPY, with a copy of the report, forwarded to the Appointment Department of this office for information.

By order of the Lieutenant-Governor of Bengal,

E. M. KONSTAM,

Under-Secretary to the Govt. of Bengal.

CALCUTTA,
The 17th October 1896.

Reg. No. 4020C—720—29-10-96.

BE LIBRARY

REPORT

OF THE

DEPARTMENT OF LAND RECORDS AND AGRICULTURE,

BENGAL,

For the year ending 31st March 1897.

Calcutta:
BENGAL SECRETARIAT PRESS.
1897.

TABLE OF CONTENTS.

		Page.
CHAPTER	I.—Prefatory	1
CHAPTER	II.—Land Records establishment	1—12
CHAPTER	III.—Utilization of land records	12
CHAPTER	IV.—Scientific and national enquiry under Imperial control:—botanical examination of the varieties of wheat, rape, and mustard; rust in wheat; betelnut plague in East Bengal; inspection of experimental farms and analyses of soils, water, manures, sugar, &c., by Dr. J. W. Leather, Agricultural Chemist to the Government of India; investigation of the methods of jute-steeping and extraction of the fibre; cultivation of rhea in Bengal; collections of articles for the Indian Museum and Imperial Institute, London; Bengal Veterinary Department, Cattle-breeding	13—16
CHAPTER	V.—Scientific and local enquiry under Provincial direction:—analyses of districts; experimental farms; agricultural experiments and introduction of new and improved staples in Government, wards', and private estates; experiments made by the Agricultural and Horticultural Society of India; trial of improved agricultural implements; supply of seeds, manures, and implements; 'crop-cutting experiments by District Officers and Settlement Officers; crop-cuttings in jail gardens; enquiry in the flooded tracts in the Argoal Circuit in Midnapore; enquiry into the agricultural condition of Satkhira, Nadia, and Jessore; sericulture	16—29
CHAPTER	VI.—Agricultural education	29—30
CHAPTER	VII.—Publication of agricultural information	30
CHAPTER	VIII.—Final:—emigration to Burmah; Agricultural exhibitions; applications for patents for inventions; Director's inspections of work in connection with record of prices-current and price-lists under the Bengal Tenancy Act; cost of agricultural experiments; officers of the Department	30—34

APPENDICES.

	Page.
I.—Mr. Nitya Gopal Mukherji's report on silk experiments	i—vi
II.—List of products of which specimens were collected for the Indian Museum, Calcutta, and for the Imperial Institute, London, during the year ending 31st March 1897 .	vii

INDEX.

	Chapter.	Page.	Para.
A.			
Agricultural education	VI	29—30	60—61
Agricultural exhibitions	VIII	31—33	64—72
Agricultural experiments and introduction of new improved staples in Government, wards' and private estates	V	23—26	43—51
Agricultural experiments—Cost of—	VIII	34	75
Analyses of districts	V	16	38
Analyses of soils, water, manures, &c., by Dr. J. W. Leather, Agricultural Chemist to Government of India	IV	14	32
Applications for patents for inventions	VIII	33	73
B.			
Bengal Veterinary Department	IV	15	36
Betelnut plague in East Bengal	IV	13—14	31
Botanical examination of the varieties of wheat, rape, and mustard	IV	13	29
Boundary marks—maintenance of	II	10—12	18—27
Burdwan Farm	V	19—21	41
C.			
Cattle breeding	IV	15	37
Collection of articles for the Indian Museum and Imperial Institute, London	IV	15	35
Crop-cutting experiments by District and Settlement Officers	V	28	55
Crop-cuttings in jail gardens	V	28	56
Cultivation of rhea in Bengal	IV	15	34
D.			
Dumraon Farm	V	21—23	42
E.			
Emigration to Burma	VIII	30—31	63
Enquiry into the agricultural condition of Satkhira, Nadia, and Jessore	V	28	58
Enquiry in the flooded tracts in the Argoal Circuit in Midnapore	V	28	57
Experiments made by the Agricultural and Horticultural Society of India	V	26—27	52
Experimental Farms—			
Number of farms	V	16	39
Inspection by Dr. Leather, Agricultural Chemist to Government of India	IV	14	32
J.			
Jute-steeping and extraction of jute fibre—Investigation by Dr. Leather	IV	14—15	33
L.			
Land Records—Establishment	II	2—10	4—17
Utilization of	III	12	28
O.			
Officers of the Department	VIII	34	76
P.			
Prefatory remarks	I	1	3
Price-list and prices-current under Bengal Tenancy Act; Director's inspection of records	VIII	33—34	74
Publication of agricultural information	VII	30	62
R.			
Rust in wheat	IV	13	30
S.			
Sibpur Farm	V	16—19	40
Sericulture	V	28—29	59
Supply of seeds, manures, and implements	V	27	54
T.			
Trial of improved agricultural implements	V	27	53

OFFICE OF THE DIRECTOR OF THE DEPARTMENT OF LAND RECORDS AND AGRICULTURE, BENGAL.

No. 1282A.

FROM C. G. H. ALLEN, Esq.,

Offg. Director of the Department of Land Records and Agriculture, Bengal,

TO THE SECRETARY TO THE BOARD OF REVENUE, L.P.

Dated Calcutta, the 6th August 1897.

SIR,

I HAVE the honour to submit the report of the Department of Land Records and Agriculture for the year ending 31st March 1897. This is the twelfth annual report showing work done by this Department under the head of agricultural enquiry, agricultural experiments, and agricultural improvements.

2. The report has been drawn up in accordance with the instructions laid down in the eighth resolution of the Government of India, Revenue and Agricultural Department, No. $\frac{3}{39-1}$, dated 20th March 1897, on the proceedings of the agricultural conferences of 1893 and of 1895-96. It is arranged under the following heads:—

Chapter I.—Prefatory.
Chapter II.—Land records establishment.
Chapter III.—Utilization of land records.
Chapter IV.—Scientific and national enquiry under Imperial control.
Chapter V.—Scientific and local enquiry under Provincial direction.
Chapter VI.—Agricultural education.
Chapter VII.—Publication of agricultural information.
Chapter VIII.—Final.

CHAPTER I.

PREFATORY.

3. Mr. P. C. Lyon was in charge of the Department of Land Records and Agriculture, Bengal, from the 18th February to 22nd November 1896, when Mr. W. C. Macpherson resumed his duties on return from furlough. I took over temporary charge of the Department on the 23rd June 1897, upon Mr. Macpherson's deputation to Orissa on special duty. The major portion of this report has been drafted by Mr. Macpherson. Mr. Nitya Gopal Mukherji acted as Assistant Director for Mr. Bhupal Chandra Basu from the beginning of the year up to 15th August 1896, when Mr. Basu, after an absence of 12 months and 15 days, resumed charge of his office as Assistant Director of this Department. Mr. Nagendra Nath Banerjei, Assistant Director, was on duty throughout the year.

CHAPTER II.

LAND RECORDS ESTABLISHMENT.

Remarks on the working of the offices established for portions of the Champaran and Muzaffarpur districts in 1896 for registration of mutations of tenant right under the Land Records Maintenance Act, III (B.C.) of 1895.

4. In Government letter No. 688T.—R., dated 30th June 1896, orders were issued to the effect that opportunity would be given to the Director of Land Records to suggest any reforms which might appear to be desirable in the direction of utilising the land records for the registration of title. It was stated that the Inspector-General of Registration would be instructed to forward his Annual Reports to this office for such remarks and suggestions as the Director of Land Records might wish to offer, and it was directed that the Director of Land Records should visit registration offices so far as convenient during his tours, and especially the offices for record of mutations recently established under Act III (B.C.) of 1895 in parts of Bihar, and report on the working of these offices.

I shall confine my remarks on the working of the Registration Department on this occasion to the working of the three offices for registration of mutation of tenant right, which were established in the middle of the year 1896-97 for portions of the Champaran and Muzaffarpur districts. The jurisdiction of the Hajipur office, in Muzaffarpur district, extends over 399 villages. Mutation Registers for 355 villages have been delivered by the Settlement Department, and for the remainder are under preparation, final publication of the records for the remaining villages having recently been completed.

The jurisdiction of the Mahnar office, also in the Muzaffarpur district, extends over 254 villages; but up to the end of the year registers for only 141 villages had been delivered. For 64 of the 157 villages in the jurisdiction of the Hajipur and Mahnar offices, for which registers remained to be delivered at the end of the year, registers have been prepared since the close of the year.

Registers for 270 villages of the Bettiah thana had been delivered by the Settlement Department by the end of July 1896; for the remaining villages of this thana the records have yet to be published finally.

The Inspector-General of Registration has favoured me with a copy of the report of the District Registrar of Muzaffarpur on the working of the mutation offices which were opened at Hajipur and Mahnar with effect, respectively, from the 1st August 1896 and the 16th August 1896. The following information is extracted from the District Registrar's report and from a note with which Mr. Stevenson-Moore, the Settlement Officer of North Bihar, has favoured me.

The statement below shows the number of applications received under Rule 5 from the Sub-Registrar of Assurances and the number submitted direct by parties to the Registrar of Mutations under section 6 :—

1896-97.		Section 6.	Rule 5.	Total.
1		2	3	4
Transfers	Permanent tenures ...	7	...	7
	Temporary „ ...	3	...	3
	Holdings at fixed rates ...	524	76	600
	Do. with right of occupancy	2,769	564	3,333
	Other holdings	215	79	294
	Total transfers ...	3,518	719	4,237

REMARKS.

Out of 4,237 applications received under section 6 and Rule 5 in the two offices of the Registrars of Mutations, 234 have been refused under Rule 24, clauses (*a*) to (*g*), 1,565 are still pending, and 2,438 have been registered. The number of refusals under Rule 24(*b*) forms the largest item, because the parties

were very reluctant to pay a process-fee of 12 annas in a case in which they had to pay a fee of 4 annas only for registration.

The mutations registered are distributed under the following heads:—

		Rs.
Successions ...	Holdings at fixed rates	39
	Do. with right of occupancy	177
	Other holdings	10
	Total successions ...	226
Transfers ...	Tenures, permanent	1
	Holdings at fixed rates	372
	Do. with right of occupancy	1,714
	Other holdings	125
	Total transfers ...	2,212
	GRAND TOTAL ...	2,438

Appeals.—Five appeals were preferred during the period under report to the District Registrar of Muzaffarpur; in two cases registration was ordered in appeal after contest; in another case registration was ordered, pursuant to a compromise entered into by the parties; two cases were pending at the close of the year.

As was to be expected, clerical mistakes and other mistakes have been found in the entries in the Mutation Registers. It is not to be looked for that settlement records absolutely correct will ever be framed. In the Muzaffarpur district about four millions of fields have been recorded. If only 1 per cent. of the four million fields have been recorded in tenancies to which they do not belong, 40,000 fields have been wrongly recorded. In other provinces it has long been recognised that a settlement record is not a perfect or sacred document, but a record which is capable of yearly improvement through the Land Records Establishment.

I have consulted the Settlement Officer of North Bihar on the subject of correction of mistakes in the Mutation Registers.

Mr. L. Hare, the experienced District Officer of Muzaffarpur, makes the following general remarks on the working of the Land Records Maintenance Act in the past year:—

"The Land Records Maintenance Act worked in this subdivision as satisfactorily as could be expected. Though the Act was actually brought into force some four months after the commencement of the year under report, with an insufficient supply of the registers of mutations, and notwithstanding the prevalence of famine, there was a remarkably large presentation of notices by the parties. The people certainly appear to be eager to have the transfers of their rights acquired duly recorded in the Government papers, in the same way as their deeds are registered. The Act, therefore, cannot but be popular among all classes, as it opens them ways to make *pucka* their rights acquired from time to time."

I have not received copy of the report of the District Registrar of Champaran on the working of the Mutation Office at Bettiah; but Mr. Stevenson-Moore, the Settlement Officer in North Bihar, has obtained and forwarded to me the following particulars of work done in the year ending 31st March 1897:—

	Succession.	Transfer.	Total.
1	2	3	4
Permanent tenures	...	...	...
Temporary „	16	47	63
Holdings at fixed rates	...	1	1
Occupancy holdings	52	1,177	1,229
Total ...	68	1,225	1,293

The numbers of transfers registered direct by the parties under section 6 and prepared by the Sub-Registrar under Rule 5 are as follows:—

	Direct by parties, section 6.	By Sub-Registrar, rule 5.	Total.
1	2	3	4
Permanent tenures	...	...	...
Temporary „	22	25	47
Holdings at fixed rates	...	1	1
Occupancy holdings	679	498	1,177
Total ...	701	524	1,225

Of the mutations registered in the Bettiah office, therefore, 57·3 per cent. were the result of notices given by parties without other formal documents.

Mr. Macpherson inspected the Bettiah Mutation Office at the end of December 1896, and found that the work was being intelligently done by Maulavi Syed Muhammad Ishak, the Registrar of Mutations. Mr. R. B. Hughes, Assistant Settlement Officer, wrote an inspection note on the Hajipur Mutation Office in February 1897; and Mr. C. J. Stevenson-Moore has favoured me with remarks on the working of all the three offices.

Mr. Stevenson-Moore considers that, although the experimental registration work in these offices has started under disadvantages on account of defects in the Act, in the rules made under the Act, and in the form of the Mutation Register, the year's figures of work done indicate that the importance of the principle of maintenance of a correct record-of-rights is recognised by tenants, and that a strong effort is being made by those interested to make the principle one of practical utility. Mr. Stevenson-Moore recommends that the Act should be extended to Lalganj and Mahua thanas in the Muzaffarpur district.

Mr. Macpherson is of opinion that useful work is being done in these offices. The chief defects in the Act are (1) that it makes no provision for the maintenance of the detailed field record of proprietary rights (it is submitted that the registration in the Collectorate under the Bengal Land Registration Act, *e.g.*, of proprietary rights in a village or estate is insufficient); (2) that it requires entry of mutations of tenant right to be made behind the backs of the landlords.

Defects in the rules and the form of Mutation Register are as follows:—

(1) No provision has yet been made for a survey amin to be attached to the Mutation Office to visit the villages and correct the maps and ascertain what portions of plots have formed the subject of transfers. Without precise information of this nature which it is often difficult for parties to furnish, correction of the Mutation Registers is often difficult.

(2) Information as to separate possession of fields in a tenancy held by several sharers, which is entered in the remarks column of the settlement khatians, has not been reproduced in the Mutation Registers. This information should probably be recorded in the Mutation Registers.

Mr. Stevenson-Moore considers that mutations of rent should be recorded; that these should be entered in the Mutation Register in the landlord's presence; and that a great moral check to illicit enhancement would thus be secured. When the question of entering mutations of rent in the Mutation Register was under discussion, Mr. Macpherson submitted an adverse opinion on the question, because it appeared and appears to him to be even more objectionable to enter

mutations of rent behind the landlord's back than to make entries of change of occupancy of a tenancy, or of part of a tenancy, behind the landlord's back.

Temporarily-settled tracts and Government estates.

Orissa temporarily-settled estates—
Area about ... ... 5,000 sq. miles.

5. A scheme prepared by Mr. Maddox, Settlement Officer of Orissa, for a system of maintenance of records by patwaris and kanungos [based on the discussions which preceded the passing of Act III (B.C.) of 1895, the Central Provinces Patwaris' rules and the rules in force in Angul and Banki] was submitted to the Board by Mr. P. C. Lyon with this office letter No. 2764S., dated 24th November 1896. This subject was discussed at a Conference held at Cutack in January 1897, at which His Honour the Lieutenant-Governor was present, and it was decided that amended proposals for the maintenance of land records by patwaris should be submitted, together with fresh estimates of cost and suggestions on the subject of legislative changes which would be required. Amended proposals and amended rules were accordingly submitted with this office letters Nos. 582S., dated 27th February 1897, and 107T.S., dated 5th May 1897.

The whole subject is now under the consideration of Government.

Khurda.

6. The work of revision of the maps and records of Khurda Government estate, in Puri district, in preparation for resettlement of rents, on the lines approved under orders contained in Government letter No. 935T.R., dated 17th November 1895, was carried out, so far as regards the map correction and the writing of the initial records, between December 1895 and October 1896. The estate, exclusive of forests, consists of 1,342 mauzas, comprising an area of 491,688 acres, or 768·25 square miles. Of this area, half is under cultivation. About 220,000 tenancies have been recorded, of which over 150,000 are tenancies paying rent to Government. Sixteen lakhiraj mauzas with an area of 9,223 acres, or 14·41 square miles, have not been surveyed.

The work done on this estate is further noticed in the settlement report for the year ending 30th September 1896 and in my letter No. 1623S., dated 25th June 1897, which contains a summary of settlement work done during the year ending 31st March 1897.

Angul Government estate, Orissa Division, settled in 1886—92.

Area 639 square miles (excluding 277 square miles of forest reserve), of which 144,812 acres were cultivated at the time of settlement; 628 villages, 30,396 rent-paying tenants, 350,000 khasra numbers.

7. Rules for the maintenance of settlement records in the Angul estate were sanctioned by the Board in their letter No. 532S., dated 20th April 1896.

In addition to the existing staff of five kanungos, an establishment of two muharrirs on Rs. 20 each a month and five chainmen on Rs. 6 each, was sanctioned in Government letter No. 386L.R., dated the 24th January 1896, in connection with the maintenance of the settlement records.

Since the close of the year ending 31st March 1897, sanction has been solicited to the employment for a period of four months of eight muharrirs on Rs. 10 a month, under the five estate kanungos, and in addition to the two muharrirs now employed in Angul for the purpose (1) of dealing with the mutation reports and petitions, and (2) to help the sarbarakars to write up detailed rent-rolls in the form of Board's Register No. 1 for Government estates with corrections up to date.

The re-writing of the detailed rent-rolls in the hands of the sarbarakars is an urgent matter for the purpose of enforcement of the progressive rent, which will fall due from September 1897.

The returns of mutation work for the half-year ending September 1896, which are the last received, show the following work done:— .

	Number of tenancies affected.	Numbers of fields affected.	Area in acres affected.	Nature of transfers.	Remarks.
1	2	3	4	5	6
Mutations	7,050	64,454	31,939·38	55,008	By inheritance.
				1,824	,, sale.
				4,056	,, partition.
				3,566	Mutual transfer (? probably exchange).
Resettlements ...	1,358	.....	2,798·09	64,454	
				10	On account of deceased tenants.
				1,315	On account of desertion.
				60	Ditto abandonment.
				1,385	
Settlement of waste land.	5,002	.....	11,394·21	.....	

Chittagong temporarily-settled estates, area 1,905·59 square miles.

8. No scheme for the maintenance of the records of the new settlement in Chittagong has been proposed, and it is not clear that any is required. The khas tahsildars have instructions to report new cultivation in unsettled lands and to record mutations in the names of talukdars, jotedars and others who pay direct to Government. It is clear that the tenants in Chittagong do not as a body require any protection from their landlords, and many of the arguments for the maintenance of the record, which are used elsewhere, are consequently inapplicable.

Maintenance of records of Backergunge Government estates and private estates held under direct management.

9. Government estate and private estates in Backergunge district, making up a considerable area, have been surveyed and settled within recent years. It has been decided that the duty of recording mutations of tenant right shall be carried on by the tahsildars of these estates, who are to be supplied with traces of the field maps and abbreviated khasras. The Board sanctioned at the beginning of March last an expenditure of a sum of Rs. 990 to meet the cost of supplying the tahsildars with copies of records, but the Collector could not arrange to take up and finish this work within the financial year 1896-97, and funds have accordingly been granted for the current year.

It is hoped that the work of supplying copies of records to the tahsildars will be pushed on as quickly as possible.

In the half-year ending 31st March 1897, 96 mutations of tenancies affecting 3,541 acres were recorded on 10 Government estates with an aggregate area of 38,787 acres and containing 1,137 tenancies. Of these, 45 were by inheritance and 51 by purchase.

It is hoped that more complete returns will be furnished in the current year.

Western Duars Government Estate.

Area settled in 1888—94	...	788 square miles.
Number of jotedars	...	23,339
Number of chukanidars	...	11,176

10. The rules for the maintenance by tahsildars of settlement records in the Western Duars, which were approved in Government letter No. 1877L.R., dated the 4th April 1895, have now been in force for two years.

It was decided, in correspondence ending with the Board's letter to the Commissioner, No. 639A., dated the 31st October 1896, that fees should be levied on transfers of jots or portions of jots and on successions to jots as follows:—

(*a*) For transfer of a jot or portion of a jot by sale, mortgage, gift, or otherwise, an acreage fee of one anna for each acre in the jot or share of the jot so transferred, in addition to the stamp fee of Re. 1 leviable on applications for transfer under article 5 of the Duars Maintenance Rules.

(*b*) For transfer of a jot or portion of a jot by succession, an acreage fee of half an anna for each acre in the jot or share of the jot so transferred, in addition to the stamp fee of annas 8 leviable on applications for transfer under article 5 of the Duars Maintenance Rules.

The mutation returns furnished to this office by the local officers under rule 11 of the Maintenance Rules show the following work done during the year under report:—

Serial number.	Nature of cases.	Pending from the previous year.	Instituted during the year.	Total for disposal.	Disposed of during the year.	Pending at the close of the year.
1	2	3	4	5	6	7
1	New settlements of jots under the Arable Waste Land Rules.	738	875	1,613	1,178	435
2	Mutation cases ...	410	884	1,294	929	365

Banki Government Estate.

Area	... 117 sq. miles.
Surveyed and settled	... 1888—92
Rent-paying tenancies at the time of settlement	... 26,478
Number of fields	... 115,775

11. Rules for the maintenance of land records by the sarbarakars in Banki, based on the rules prescribed for Angul, were approved by the Board in orders communicated with their letters Nos. 493A., dated 14th April 1896, and 1137, dated 29th July 1896.

A survey instructor was sanctioned by the Board for three months for the training of the sarbarakars at a cost of Rs. 100, and an expenditure of Rs. 700 was also sanctioned for the supply of instruments to the sarbarakars. The Board, in their letter No. 27A., dated 20th January 1897, sanctioned an extra establishment of two amins at Rs. 20 each per month, one muharrir at Rs. 15, and three chainmen at Rs. 5 each, making up an annual cost of Rs. 780 for supervising and testing the work of the sarbarakars. Sanction has been accorded to the recognition of partitions of holdings and to the levy of a fee of 2 annas an acre, subject to a maximum fee of Rs. 5, for such partitions. Sarbarakars have been deprived of their power to issue permits for the cultivation of waste lands, as they were reported to have abused the powers given them.

For the purposes of the maintenance of the records, the Board directed the adoption of an abbreviated khasra, based on the *charsala* form of the Central Provinces Patwari Rules, without the columns of crop statistics. Traces of the village maps and copies of survey khasras and khatians have been supplied to sarbarakars. No report has yet been received in this office as to the progress made in the writing of the *charsala* khasra. The necessary mutation forms and registers have been printed.

During the half-year ending 30th September 1896, sales of tenant right affecting 80 tenancies and 181 fields were recorded, one re-settlement of an

abandoned holding was made, and 60 new settlements were sanctioned. No returns of mutations for the half-year ending 1st March 1897 have been received.

Burdwan Raj Estate.

Total area of the estate	...	79,582·3 acres.
Total number of tenancies	...	14,527.
Total number of fields in the estate	...	199,499.

12. The mutation returns of the Burdwan Raj Khas Mahals for the year ending 31st March 1897 show that during the year 10 sales and 3 partitions, making in all 13 transfers of occupancy rights, took place, affecting 115 fields with an area of 44·3 acres. Out of a total of 730 absconded and abandoned tenancies comprising an area of 1,946·6 acres, 69 tenancies with 254·4 acres were settled during the year, and 758·9 acres of waste land were settled with 106 new tenants at the rates paid for the adjacent lands of similar quality. The mutation returns are maintained under executive order by the tahsil establishment. The returns for the year ending 31st March 1897 refer to the districts of Burdwan, Birbhum, Bankura and Hooghly.

Sujamutha Ward's Estate.

Area 42 square miles, contained in 60 villages.			
Surveyed and settled in 1889-93.			
Number of fields	...	...	... 82,250
„ tenancies	...	...	... 10,915

13. The Land Records Maintenance Act III (B.C.) of 1895 was extended to pargana Sujamutha in Midnapore by Government notification No. 4609 L.R., dated 21st November 1896, with effect from 1st January 1897. The writing of the mutation registers for the mutation offices has not yet, however, been commenced; and without these registers no work can be done by the Registrars of mutations. In my letter No. 229T.S., dated 1st June 1896, I have offered recommendations for the consideration of the Board as to the action to be taken.

Maldwar ward's estate's area 145·4 square miles, surveyed in 1888-90, number of tenancies then recorded 23,019.

14. The arrangements to be made for maintenance of the maps and rent-rolls of this estate are under the consideration of the Collector.

The returns of mutations of tenancy received for this estate during the half-year ending 30th September 1896 show very little work done, and they do not indicate the total number of tenancies affected. The returns prescribed in Board's Circular No. 10 of May 1896 are awaited.

Dakhin Shahbazpur Ward's Estate.

Area	...	...	146 square miles.
Settlement completed in 1895-96.			
Number of tenancies	...	30,125	
Number of plots	...	...	174,476

15. The Board approved the following action in the direction of the maintenance of the maps and settlement records of the Dakhin Shabazpur estate in Backergunge in their letter No. 1506A., dated 9th November 1895:—

(1) Copies of the village maps to be furnished to the Manager of the estate.

(2) The working rent-roll of the estate, prepared from the settlement papers, is to be maintained so far as regards the tenants with whom the Court of Wards is in direct relation.

(3) A field-to-field check of the map and of the principal entries made in the khasra is to be made in all the 47 villages and chars of the estate by the present tahsil establishment.

(4) Notes of mutations are to be entered in registers.

A kanungo on Rs. 40 and two amins were appointed temporarily for the purpose of making diluvion enquiries and training the tahsil establishments in survey. The diluvion that took place up to 1895-96 was enquired into by the kanungo and amins during that year. The Manager of the estate was able to report in July 1896 that 25 out of the 37 tahsil muharrirs had learnt survey sufficient for the purpose of maintenance of records; some of them had previously served as survey amins.

A form of abbreviated khasra or field index for use in maintenance of the rent-roll was approved in the Board's letter No. 1599A., dated 29th October 1896. In this shortened khasra will be entered all *dags* (numbers) in the first instance from the original khasra; but the shortened khasra will be corrected only so far as regards fields, in possession of tenants paying directly to the ward. The field maps are being photozincographed in the Survey Office; for 6 villages 25 copies of each map have been supplied, and copies for the remaining villages will be supplied shortly. The writing of the abbreviated khasras for 23 out of 47 villages had been finished by the end of March 1897.

The half-yearly returns of mutations received from the Collector for the half-years ending 30th September 1896 and 31st March 1897 show that in the first half-year 77 mutations of tenancies were recorded (40 of which were sales and 37 successions), and that 4 settlements of new lands were made; during the second half-year 94 mutations of tenancies were recorded (67 of which were sales and 27 successions), and 5 settlements of new lands were made.

Kujong Estate in Cuttack.

16. This estate has an area of 236,878 acres, of which 146,856 acres, or nearly 230 square miles, were cadastrally surveyed in the years 1888—90; the rest of the estate consists of jungle and rivers. The settlement of rents on the settled portion of the estate was completed in 1893. About 72,000 acres of the estate are in the occupation of some 29,000 tenants, including rent-free holders.

Copies of the settlement khatians and khasras have been supplied to the estate tahsildars, and the working rent-rolls in the hands of the tahsildars are in accordance with the settlement khatians. The present tahsil establishment having been reported to be insufficient to perform the work of ascertaining and recording mutations of tenancies in addition to collecting the rents, the question of revision of the establishment is under consideration. Men competent to correct maps and records are available on this estate, as it was reported in 1890 that 101 zimbadars of the estate had qualified themselves in survey, and that 80 of them were in fact being employed by the Survey Department in survey of the temporarily-settled estates in Orissa.

Returns of mutations of tenancies recorded during the half-year ending 30th September 1896, which are the latest received, do not show that much work is being done.

Kanika E state in Cuttack.

Area cadastrally surveyed	278 sq. miles.
Surveyed and settled in 1889—94. Number of tenancies and parcels of land held directly from the proprietor as ascertained in the settlement	30,980

17. The Kanika estate maps and records are maintained under rules drawn up by Mr. Sakhawat Hossein, formerly Manager and Settlement Officer of Kanika, which were provisionally approved and which have been in force for three years. The following statement shows the mutations registered during the last three years:—

	Transfer by sale.			Transfer by inheritance.			Partitions.		
	1894-95.	1895-96.	1896-97.	1894-95.	1895-96.	1896-97.	1894-95.	1895-96.	1896-97.
1	2	3	4	5	6	7	8	9	10
Number	783	471	268	221	867	1251	Nil	3	1
Area in acres	1,160·65	718·43	403·42	1,328·85	3,855·09	5,213·02	Nil	5·57	3·10
Fees paid	Rs. A. P. 241 2 0	Rs. A. P. 135 14 0	Rs. A. P. 86 6 0	Rs. A. P. 125 2 0	Rs. A. P. 423 14 0	Rs. A. P. 443 8 0	Nil	Rs. A. P. 1 0 0	Rs. A. P. 0 8 0
Sale money paid for tenancies transferred	.....	.....	4,839 5 5	.....	.....	.....	.....	.....	.....

Of the 1,520 cases of mutations of all kinds recorded in 1896-97, as shown above, 47 mutations by sale of entire holdings and 1,201 mutations by inheritance were reported in the first instance by the bissoyees, and the rest of the mutation cases were initiated by applications filed by the tenants.

The establishment now employed on the work of maintaining records in Kanika consists of 3 elakha kanungos on Rs. 30 each, 1 assistant kanungo on Rs. 20, 3 elakha cutcherry muharrirs on Rs. 10 each, 1 ijardar of Mukha Jagula (paid by commission), 95 circle bissoyees on Rs. 10 each. The Manager reports that the circle bissoyees have prepared their copy of the abbreviated khasras and village traces very neatly. They paid for the tracing cloth, ink, &c., but the estate furnished printed forms. The circle bissoyees have thus supplied themselves with a complete set of village records, which are quite sufficient for all their field work.

All the kanungos and the muharrirs, and about 50 per cent. of the bissoyees, are competent to correct and add to the village traces. The remaining bissoyees are being gradually trained, and the present Manager hopes that in two years more all of them will be fully trained.

MAINTENANCE OF BOUNDARY MARKS.

18. The following is a summary of the information received from district officers under rule 20, part II, chapter 4, page 31 of the Survey and Settlement Manual of 1895, on the subject of the action taken during the year to carry out the rules for the inspection and upkeep of permanent boundary marks.

The information contained in the extracts from the Land Revenue Administration Reports of district officers is not always complete. In some districts it is stated that boundary pillars have been removed, but the reports do not generally show whether the boundary marks have been marked on 4-inch maps filed in the Collectorate (rule 16), whether the marks have been periodically inspected (rule 17), whether cases of injury or removal of boundary marks have been detected and punished (rule 18), or whether information has been regularly received from village officers (rule 19). It is hoped that more precise information on these subjects will be furnished in future reports.

Burdwan Division.

19. In Hooghly it is reported that the permanent survey marks were inspected and found to be in good order, and that steps are being taken for constructing and repairing the boundary pillars of khas mahal Rishra.

In Midnapore the attention of tahsildars of Government estates and Managers of Wards' estates and of all police officers and chaukidars was drawn to the rules of the Survey and Settlement Manual, and it apears from their reports that, with a few exceptions, the permanent survey marks are in existence, In several estates no permanent marks were placed during survey.

Presidency Division.

20. In the 24-Parganas the iron pillars marking the boundaries of the Government estate of Panchannagram are all in good condition. In the Basirhat subdivision the iron pillars are in good condition, but some of the masonry marks are injured and will be replaced by iron pillars. The Subdivisional Officer and the nazir inspected the pillars in the Government estates in the subdivision of Barasat.

In Nadia the Collector inspected a few survey marks during the year in the course of his cold-weather tour and passed orders for their repair.

The boundary marks of the khas mahals in the Jangipur subdivision of the Murshidabad district are reported to be in good condition.

In Khulna the trijunction points of villages in the Tantibania estate were marked during the survey of 1895 by clay pillars of Raniganj pottery; these are in their proper places.

Rajshahi Division.

21. In Rajshahi police subordinates, chaukidars and panchayets were directed to report upon the condition of the pillars in their jurisdiction. Their reports show that seven iron pillars have been damaged. No steps were taken

to repair these pillars, but they will be again inspected during the current year, and repaired if necessary. Two iron pillars, which had been shifted from their position and damaged by the action of the river Padma, were replaced.

In Dinajpur steps are being taken to replace two boundary marks which have been washed away by a river and seven which have been removed.

In Jalpaiguri the boundary marks of the tea-gardens were inspected by the Settlement Officer, and the Deputy Commissioner also inspected some of the boundary pillars during his tour through the Duars with satisfactory results.

The Collector of Rangpur and the police enquired into the condition of the district boundary marks between Cooch Behar and Rangpur and Goalpara. Several of these boundary marks have been destroyed or damaged. An attempt will be made during the current year to arrange for the better maintenance of these marks.

Dacca Division.

22. In the Dacca district the boundary pillars of Government and Wards' estates were occasionally inspected during the year, and are reported to be generally in good condition. Some of the great trigonometrical survey pillars require repair. Subdivisional Officers and the Khas Mahal Deputy Collector have been directed to inspect the boundary pillars of Government estates annually, and to have quarterly inspections made by the tahsildars.

In Mymensingh the permanent boundary marks at trijunction points of the Government estates were inspected by the tahsildars and kanungos; no injury was reported.

In Faridpur the permanent survey marks in khas mahals are inspected periodically by the tahsildars when they make their quarterly collections. One person was convicted for removing a boundary pillar, and another case is under trial. Panchayats, chaukidars and other village officers have been directed to give notice of any injury to boundary marks within their villages.

In Backergunge the Settlement Officer, Assistant Settlement Officer, the Subdivisional Officers and the Deputy Collectors in charge of khas mahals were instructed to inspect boundary marks, and panchayats, chaukidars and khas mahal tahsildars have been ordered to give notice of any injury to boundary marks within their villages. The stone prisms embedded in the course of the survey operations under the Bengal Tenancy Act are in good condition, with the exception of a few which are being repaired.

Chittagong Division.

23. In Tippera 66 pillars in the Sarail Ward's Estate were either destroyed or removed; these are being replaced. Two pillars removed in Chakla Roshnabad have been replaced. The permanent marks in Government estates have been duly preserved.

In Chittagong the orders regarding the periodical inspection of permanent survey marks were communicated to the Managers of Wards' and Government estates; no damage to boundary marks was reported.

Patna Division.

24. In Patna the Subdivisional Officers, District Superintendent of Police, and the Managers of the Court of Wards' and Government estates have been directed to inspect permanent survey marks. The Collector is noting these marks on the district map.

In Gaya the permanent survey marks were inspected by the Collector, the officers of Government estates, and estates under the Court of Wards and by the sub-divisional officers while on tour. It is reported that in many cases the mud pillars have disappeared, but steps are being taken to replace them by stone pillars. The police enquired into a case of the removal of a boundary pillar in mauza Bishenpur, belonging to the Tikari Raj. The Manager of the estate has been directed to replace the pillar.

In Shahabad Managers, tahsildars and patwaries were directed to make quarterly inspections of the permanent survey marks in their villages. Three stone pillars have been removed, and are being replaced.

In Champaran the Managers of the Bettia Raj, of the Madhuban estate, and of all factories were requested to undertake the inspection of the permanent village boundary marks in their respective estates. Most of them have consented, to undertake the work, but no reports of inspection have yet been received except from the Manager of Lalserai, who states that the boundary marks in his factory were in good order on the 1st April 1897.

In Muzaffarpur the boundary marks have all been inspected by the kanungo in charge of collections, and they are reported to be in good condition. Panchayats and chaukidars were reminded of their duty with regard to inspection of boundary marks, but no case of removal or destruction was reported during the year. In the Sitamarhi subdivision some boundary pillars were washed away by floods, and are being replaced by the Survey Officers.

Bhagalpur Division.

25. In Monghyr some permanent survey marks have been washed away by the Ganges.

In Malda the boundary pillars of khas mahal estates were inspected by the Manager and found in good repair.

Orissa Division.

26. In the Kanika estate in Cuttack no less than 897 boundary marks are missing; of these, however, only 194 were stones, and the rest baked clay cylinders. The damage was generally due to river action. Arrangements are being made by the Manager to replace the missing marks.

In Angul the boundary marks were inspected by sarbarakars, and the Deputy Commissioner himself inspected the pillars of 12 villages. Nearly one-half of the pillars are reported to be either demolished or damaged.

In Puri instructions on this subject were issued to the sarbarakars, kanungos and tahsildars of Government estates and estates under the Court of Wards, and to village patwaris and chaukidars, but it is not reported whether any inspection was made.

No action has yet been taken for the inspection of boundary marks in the temporarily-settled estates which are under survey and settlement in Orissa. The Commissioner has asked for a list of the permanent survey marks embedded during the recent survey in each district, together with 10 copies of the district maps on the scale of 1 inch to 4 miles. I am in correspondence with the Superintendent of Settlement-Surveys as to the action to be taken both in this and in the other survey and settlement operations in progress.

Chota Nagpur Division.

27. In Hazaribagh 14 of the masonry boundary pillars erected in the Government estate Hazaribagh Hata at last settlement have been destroyed, and 10 require repair. Action is being taken by the Deputy Commissioner.

In Lohardaga boundary pillars of 20 villages in the Barkagarh Government estate were inspected by the tahsildar, and two of these villages were also inspected by the Deputy Collector in charge of Government estates. The boundary pillars in 15 of these villages are reported to be in good condition. Some of the boundary pillars in the remaining villages require repair.

In Palamau Mr. Cargill inspected the boundary marks in several villages and found them in good order. The survey marks in the Panjrikallan wards' estate were inspected by the Sub-manager with satisfactory results.

CHAPTER III.

UTILIZATION OF LAND RECORDS.

28. No action was taken during the year under report, as the scheme of maintenance is not yet sufficiently advanced in any part of the Province to admit of the utilization of the land records in the manner prescribed by the Government of India.

CHAPTER IV.

SCIENTIFIC AND NATIONAL ENQUIRY UNDER IMPERIAL CONTROL.

Botanical examination of the varieties of wheat, rape, and mustard.

29. With a view to make a beginning in a scientific examina ion of the field and garden crops of these Provinces (of which a list was given in Bulletin No. 1 of this Department published in 1895), the Bengal Government, in their letter No. 138T.R., dated 5th June 1894, directed that detailed reports should be prepared by this Department on the cultivation of certain important crops. Monographs on wheat and rape and mustard were accordingly prepared by the Assistant Directors of this Department, in which all information as to these crops available in existing reports and publications was embodied and circulated to District Officers for addition and revision. The aid of Brigade-Surgeon-Lieutenant-Colonel G. King, C.I.E., Superintendent of the Royal Botanic Gardens at Sibpur, having been sought in the botanical examination of mustard and wheat, Surgeon-Major D. Prain, Curator of the Herbarium, Botanical Gardens, Sibpur, suggested that samples of seed of wheat and of rape and mustard might be obtained from every district in Bengal and sown in the Sibpur Farm, so that the crops might be botanically examined by him during their growth. Seed samples were accordingly obtained from District Officers and were sown in the Sibpur Farm during the *rabi* season of 1895-96, and Dr. Prain availed himself of this opportunity of examining the crops in the field. As the result of his examination, Dr. Prain has written an interesting note on the botanical features of wheat and of the races of wheat in these Provinces, which, with his permission, has been printed as a bulletin of this Department. In this bulletin, Dr. Prain points out that the results of his examination indicate that the "number of forms of wheat recognized has been much exaggerated (so far as Bengal is concerned), and that the most distinct of these forms, though possibly to be considered distinct races, in no case deserve to rank as separate varieties." Dr. Prain has also been studying the races of rape and mustard grown in Bengal. His report on this subject has recently been received in this office. My thanks are due to Dr. King and to Dr. Prain for the valuable assistance which they have rendered to the Agricultural Department by the botanical study of the wheat, rape, and mustard crops grown in these Provinces. The monographs on these crops, written by the Assistant Directors, will now be revised in accordance with the additional information obtained from district reports and from Dr. Prain's notes.

Rust in wheat.

30. During the cold season of 1895-96, while Surgeon-Major D. Prain, Curator of the Royal Botanic Gardens, Sibpur, was engaged in studying the wheat crops at the Government farm at Sibpur, his attention was drawn to outbreaks of rust in some patches of wheat grown on the farm. The result of his observations pointed to a certain field weed (*Launea Asplenifolia*), closely resembling the English dandelion, as the host of one of the rusts which attacked the wheat at Sibpur. The weed is common in Bengal, and is abundant about Sibpur, where it is locally called *tikchana*. Dr. Prain afterwards extended his observations to some of the wheat-producing districts of these Provinces, as well as of the Central Provinces and of Upper India. Dr. Prain succeeded in collecting much information which has been made the basis of a most interesting note on Indian wheat rusts, which he has drawn up in collaboration with Brigade-Surgeon-Lieutenant-Colonel D. D. Cunningham, C.I.E. This note was published in September last as No. 7 of the Records of the Botanical Survey of India. The result of the report is to show that several forms of rust attack Indian wheat.

Betelnut plague in East Bengal.

31. In consequence of the receipt of information from the districts of Noakhali and Backergunge of the prevalence of a wide-spread plague among betelnut trees, Mr. N. G. Mukherji, Officiating Assistant Director of Land

Records and Agriculture, Bengal, made a tour of investigation in these districts and submitted a report, dated 29th March 1896, which was forwarded to Government with this office letter No. 624, dated 27th April 1896. Subsequently, under the orders of the Bengal Government, contained in their letter No. 154, dated 11th May 1896, Mr. N. G. Mukherji was instructed to accompany Dr. G. Watt, C.I.E., Reporter on Economic Products to the Government of India, on a tour of inspection in the tracts where betelnut-trees were suffering from disease. Dr. Watt and Mr. Mukherji started for their tour of inspection in the middle of May 1896, and spent ten days in the Khulna, Backergunge, and Noakhali districts. On his return to Calcutta at the end of May 1896, Mr. Mukherji reported that the disease among betelnut trees had subsided for the year.

In accordance with the instructions of Government, the Collectors of betelnut-growing districts were supplied with copies of Mr. Mukherji's report, and were asked to give wide circulation to Dr. Watt's recommendation that affected trees should be cut down and burned. The District Officers were also asked to report whether the disease was abating or otherwise, whether the cultivators were combating it by burning or otherwise, and whether they had made new nurseries. From the reports which have been received in this Department from the Collectors of Khulna, Dacca, Noakhali, and Backergunge, it would appear that the disease has been abating in these districts. Two explanations of the alleged disease among betelnut palms were put forward in Noakhali in February last:—(1) It was stated that the betelnut palms were dying because the plantations are overcrowded (not only with betelnut palms, but with cocoanut palms and other trees), and because manure is not given or is not given in sufficient quantity; (2) it was stated that the palms were dying because rain had been insufficient for the last two years.

Specimens of diseased betelnut palms and cocoanut palms have been sent to Dr. G. Watt and to Dr. D. D. Cunningham for favour of examination. Dr. Watt has promised a report on this subject.

Inspection of experimental farms and analyses of soils, water, manures, sugar, &c., by Dr. J. W. LEATHER, *Agricultural Chemist to the Government of India.*

32. Dr. J. W. Leather, PH.D., Agricultural Chemist to the Government of India, visited the Dumraon and Burdwan farms during the last cold weather, and contributed valuable advice on the conduct of experiments on these farms.

In both these farms, Dr. Leather made a number of analyses and experiments with sugarcane as a part of a series of experiments which he is making on other farms in India, in order to ascertain the chemical composition of Indian sugarcane and raw sugar. The results of analyses have been published as an agricultural ledger by the Government of India (Ledger No. 19 of 1896). He also analysed several samples of manures which were sent to him from the Dumraon and Burdwan farms.

Samples of soils and water from certain tracts in North Bihar, where raiyats have objected to irrigate their lands from wells or to sow *rabi* crops, and from neighbouring places, where *rabi* crops are irrigated, were sent to Dr. Leather, for analysis, and with a view to his advice being obtained as to whether well irrigation would be likely to be harmful in the tracts in which it is not practised. The analysis showed that the samples of soils taken from tracts where well irrigation is not practised contained no appreciable amount of salts.

The samples of well water which the raiyats objected to use for irrigation contained more sodium salts than the samples of well water from irrigated tracts, but the amount of salts found in the first-named samples was not so great as would cause any injury to crops. Dr. Leather was of opinion that the soils which are not now irrigated can be irrigated with perfect safety.

Investigation of the methods of jute-steeping and extraction of the fibre.

33. Dr. J. W. Leather, Agricultural Chemist to the Government of India, visited the jute districts during the rainy season of 1895-96 to investigate the methods of jute-steeping and stripping of the jute fibre, and was accompanied by Mr. Macpherson and by Mr. N. N. Banerjei, Assistant Director. As the result of his visit, Dr. Leather wrote notes on the methods of cutting, steeping, and stripping of jute practised at Narayanganj, Serajganj, and

Jalpaiguri, which have been incorporated in Agricultural Ledger No. 37, published in December 1896.

This subject has also received the attention of Dr. G. Watt, Reporter on Economic Products to the Government of India. Neither of these officers, however, has been able to suggest any change in the systems of separation of the jute fibre as practicable.

Cultivation of rhea in Bengal.

34. During the year under report Dr. Watt, Reporter on Economic Products to the Government of India, was asked by the Government of India to prepare a hand-book on *rhea* fibre cultivation. The District Officers of Rangpur, Dinajpur, Bogra, Rajshahi, Pabna, Malda, Dacca, Purnea, Chittagong, Mymensingh, Tippera, and Jalpaiguri, and the Superintendent of the Cooch Behar State, were asked by this Department to furnish Dr. Watt with information regarding *rhea* cultivation. Subsequently in January 1897, Dr. Watt made a tour of exploration through certain districts of Bengal where the *rhea* fibre plant is grown, or where it seems likely that its cultivation might be extended. At Dr. Watt's request, an Overseer of this Department, Babu Nibaran Chandra Chowdhry, who is acquainted with the districts where *rhea* fibre is grown, accompanied him on his tour. It is understood that Dr. Watt's report on *rhea* fibre cultivation is now under preparation.

Collection of Articles for the Indian Museum and Imperial Institute, London.

35. During the year under report, 103 specimens of economic products were collected by the Overseers of this Department under the instructions of Mr Banerjei, Assistant Director, for the Imperial Institute, London, and were forwarded to the Reporter on Economic Products to the Government of India. The cost of the articles collected amounted to Rs. 302-8-6. A list of the products of which specimens were collected is given in page vii, Appendix II of this report.

Bengal Veterinary Department—Cattle-breeding.

36. The work of the Bengal Veterinary Department has been separately reported up on by Veterinary Captain Raymond, Superintendent of the Bengal Veterinary Institution. His report was submitted with a review to Government with this office letter No. 1085A., dated 1st July 1897.

37. The results are not on the whole encouraging. Fifteen bulls have been supplied by this Department to jails, Government estates, Wards' Estates and Municipalities. Of these, 10 are useless, and only five have rendered any service in improving the breeds of cattle. The worst results were obtained with bulls maintained at jails. The Hissar bulls in the Krishnagar and Comilla Jails were too old to be of much use. The bull at the Bhagalpur Jail is also said to be getting too old for breeding, and is not popular with the cultivating classes, who have already a fairly good breed of cattle. The Bankipur bull at the Jessore Jail is also getting past breeding, and only covered seven cows during the year.

On the other hand, the two Hissar bulls maintained in the Government estates at Nasriganj and Buxar continued to be very useful, and considerable improvement has resulted to the breed of cattle at Buxar and in the neighbouring villages from their use. The first and second prizes in the last Barhampur Show in Shahabad were awarded to the progeny of the Buxar bull. This bull was much appreciated by the people, and its death on the 6th January 1897 was a serious loss. The Hissar bull maintained in the Nasriganj Government estate is reported to be very popular in its vicinity, and its progeny command better prices than those of country bulls. The Nellore bull in the Bettiah estate died during the year. Its stock shows great improvement over the local breed. Four healthy bull-calves and four cow-calves have been got from this bull. Several failures have, however, also to be chronicled. The Bachour bull in Mainaguri died on the 22nd July 1896; it was not of much use. The Burman bull at Mymensingh is useless on account of old age. The Bankipur bull maintained by the Hooghly Municipality is said to be too big for the country cows. The two Brahmini bulls sent to the Collector of Birbhum are too small. The Brahmini bull supplied to the General Manager, Wards' estates, Chittagong, served eight cows during the year. Three out of its calves

are strong and healthy. The progeny of the Patna cross-bred bull, which was sold last year to Mr. Fox of Kutea Factory, Bihar, promise well. Three applications for Hissar, Brahmini, and Bankipur cross-bred bulls were received during the year, but these could not be dealt with.

Veterinary Captain Raymond gives an interesting tabular history of every bull which has been supplied in the past by the Civil Veterinary Department or the Agricultural Department for breeding purposes. Hissar bulls seem to have been more successful than those of any other breed. The degeneration of stock in the Lower Provinces is attributed mainly to the want of good breeding bulls, and partly also to the absence of grazing areas. Veterinary Captain Raymond has given much attention to this subject, and intends shortly to submit a comprehensive report upon it.

CHAPTER V.

SCIENTIFIC AND LOCAL ENQUIRY UNDER PROVINCIAL DIRECTION.

Analysis of Districts.

38. In accordance with orders passed in Bengal Government letter No. 688T.R., dated 30th June 1896, in connection with the proceedings of the Agricultural Conferences held in Calcutta in January and February 1896, it was proposed that Mr. Bhupal Chandra Basu, Assistant Director, should write a report on the Shahabad district during the last cold weather, but, owing to additional work in connection with the famine, neither of the Assistant Directors could be spared for the work. The districts for which special reports have been prepared by Assistant Directors in former years are Burdwan, Dacca, Cuttack, and Lohardaga.

Experimental Farms.

39. Three experimental farms were maintained under the supervision of the Department during the year under report, viz., one at Sibpur near Calcutta, the second at Burdwan, and the third at Dumraon in Shahabad. The farms are under the immediate management of Overseers, who work under the instructions of the Assistant Directors of this Department. Mr. N. N. Banerjei held charge of the Burdwan and Dumraon farms throughout the year. Mr. N. G. Mukherji supervised the work of the Sibpur farm up to August 1896, when Mr. B. C. Basu resumed charge. Details of the experiments conducted in the above farms will be found in the Farm reports for the year, which will be published separately. Only an abstract of the chief operations undertaken is given below.

Sibpur Farm.

40. The work done on the Farm during the year under report may be divided under the following heads :—(1) Botanical study of the races and varieties of rape and mustard, and of cotton grown in Bengal; (2) experiments with manures; (3) experiments in methods of cultivation; (4) experiments with new crops and new varieties of existing crops; (5) experiments with new and improved implements; (6) conservation of cattle dung, and (7) distribution of seed and implements.

(1) *Botanical study of races of rape and mustard and cotton.*—It was stated in the last Annual Report that an experiment was made in the cold weather of 1895-96 on the Sibpur Farm with varieties of wheat grown in Bengal, with a view to the botanical study of the plants of each variety from the time of germination to the ripening of seed. The botanical study was made by Dr. Prain, Curator of the Royal Botanical Garden, Sibpur, and resulted in a valuable note by him on the races of wheat grown in Bengal, which was recently published as Bulletin No. 2, Agricultural series of the Bengal Agricultural Ledger. During the year under report, Dr. Prain made a similar study of the races and varieties of rape and mustard grown in the Lower Provinces. For the purpose of this study, small quantities of seed of every variety of rape and mustard grown in every district of Bengal were obtained, and out of these 143 samples were selected and sown in small plots at the end of October 1896. Dr. Prain examined the plants from the time of germination to the time when

the crops were ready for reaping. A report on the botanical character of the varieties examined by Dr. Prain has been recently received in this office.

For the purpose of a similar study of the races and varieties of cotton grown in Bengal, 44 samples of seed were obtained from different parts of Bengal and were sown in the Sibpur Farm in the year under report. Dr. Prain was, however, unable to undertake this study. Dr. Watt, Reporter on Economic Products to the Government of India, who has been devoting much attention to a botanical investigation of Indian cottons, was therefore requested to examine the cotton crops growing at Sibpur, and to utilise them, if he thought proper, for the purpose of his investigation. Dr. Watt visited the farm and examined the crops in December last, and at his request specimens of leaves, flowers, pods and wool have been supplied to him.

(2) *Manure experiments.*—Only one experiment need be noticed under this head. Owing to the variable composition of the soil of the farm, it is not found possible to make any comprehensive experiments in manuring on the farm. In the few comparative experiments made during the year, care was taken to confine them within small areas within which the soil was thought to be fairly uniform, and in duplicating the experiments, wherever possible, so as to guard against accidental variations. The only manure experiment made during the year under report, which gave a fairly reliable result, was meant to contrast the merits of crude saltpetre with those of castor cake as a manure for cabbages. This experiment has been made annually since 1894-95. The result obtained in the year under report tends to confirm the experience gained in previous years as to the value of saltpetre as a leaf-producing manure. It has been seen that the use of 12 maunds of crude saltpetre per acre produces very nearly the same outturn of cabbages as the use of 30 maunds of castor cake, the cost of the two manures being practically the same. It has also been found that cabbages manured with saltpetre mature about a fortnight earlier than cabbages manured with castor cake, which is ordinarily used. Market gardeners, whose object is to bring their crops as early into the market as possible, may well take advantage of the forcing power of saltpetre, and use it to supplement the manures which they now use.

(3) *Experiments in methods of cultivation.*—The experiments under this head were (*i*) an experiment to determine the comparative merits of deep and shallow ploughing; (*ii*) experiments to determine the comparative merits (*a*) of planting potatoes in single and double rows, (*b*) of planting potatoes at different intervals, and (*c*) of planting "cut sets" and whole tubers; and (*iii*) an experiment in *ratooning khari* sugarcane.

The experiment in deep *versus* shallow ploughing has not as yet yielded any conclusive results. The experiment in planting potatoes in single and in double rows, which has been made annually since 1893-94, has shown that, while planting in double rows gives a larger outturn than planting in single rows, the increase in outturn is very nearly balanced by the increase in cost of cultivation due to the use of a larger quantity of seed in case of double rows. The experiments in planting potatoes at different intervals, and in planting "cut sets" and whole tubers, were vitiated last year by an attack of red ants, and the results obtained from them are therefore inconclusive. The experiment in *ratooning khari* sugarcane, which was initiated in 1891-92, confirmed the experience gained in previous years as to the free *ratooning* powers of this variety of sugarcane. The yield of the plot which was planted in 1891-92, and has since given five crops in succession with a fairly good yield, fell off considerably in the year under report, the sixth from the year of planting. The plots planted in later years still continue to give a satisfactory yield of jaggery. Although the *khari* variety possesses a great advantage over all other varieties in its power to *ratoon* freely, it suffers from two disadvantages which detract from its value. The disadvantages are, first, that the jaggery from *khari* has a slightly saline taste, and is not so well suited for the manufacture of refined sugar as jaggery from the *Samshara* variety, which is preferred to all others for that purpose; and, secondly, that the canes gradually get harder every year, thus rendering the task of crushing them more difficult and expensive. There is little doubt, however, that in those parts of the country where the thicker and more succulent varieties of sugarcane cannot be raised with profit for want of sufficient moisture in the soil or where the sugarcane crop is liable to depredations of wild animals like

bears, the hardiness of the *khari* variety and its power to resist drought give it a great advantage over all other varieties grown in these Provinces, while its power to *ratoon* freely saves the cost of planting it annually. The *khari* variety was grown in the Dumraon Farm last year, and appears to have taken the fancy of the cultivators of the neighbourhood. It seems to have a future in the dry districts of Bihar.

(4) *Experiments with new crops and new varieties of existing crops.*—The new crops successfully grown on the farm in the year under report were Russian sunflower, oats, Chinese cabbage and fodder grasses. Besides, 11 varieties of sugarcane, 10 varieties of Indian and foreign tobacco, and 10 varieties of exotic cotton were experimentally grown. Russian sunflower was grown both as a rain and a winter crop, but it was found to do best in the cold weather. An outturn of 56 lbs. of seed was obtained from one-tenth of an acre of land; the seed on crushing yielded 9 per cent. of oil. The yield of oil, compared with the usual kinds of Indian oilseeds, was very poor. The oil appears, however, to be beautifully clear and agreeable to the taste. A sample of the oil was submitted to the Reporter on Economic Products to the Government of India for opinion, but he reports that the oil is not at present of any economic value.

Chinese cabbage grew very well on the farm, but there was no demand for this vegetable, except a very limited one among the Chinese residents of Calcutta.

Oats have been successfully grown on the Sibpur Farm for many years past. During the year under report, the crop was grown on $1\frac{2}{5}$ acres of land, of which one-fifth of an acre was manured with cattle dung at the rate of 300 maunds per acre, and the rest received no manure. The outturn of the whole area was 1,961 lbs. or at the rate of 1,401 lbs. or about 17 maunds per acre.

The fodder crops grown on the farm were Guinea grass, *Reana luxurians*, and sugar *sorghum*. These crops have been raised successfully for several years past on the Sibpur Farm.

The experimental cultivation of the varieties of sugarcane, tobacco and exotic cotton did not yield any results of special interest.

(5) *Experiments with new and improved implements.*—The Sibpur plough, the "Planet Jr." American hoe, the Behea 3-roller sugarcane mill and the chaffcutter have been in use in the Sibpur Farm for several years, and continued to give satisfaction. During the year, a set of spraying bellows was imported from America. These are of simple design, and appear to be very well suited for spraying insecticides on garden plants. The American hoe has been found to be a very useful implement for hoeing and weeding between drills, but the implement which costs Rs. 30 is believed to be too expensive to come into general use among the cultivators of Bengal. It has been found possible to construct the hoe on a simplified design at a much cheaper cost in this country. A number of hoes have been recently made by a native blacksmith under the direction of Mr. Basu at a cost of Rs. 9-8 each. These have been found to give very nearly as good work as the original American hoe.

(6) *Conservation of cattle dung.*—The proper conservation of cattle manure has received much attention in the Sibpur Farm since 1892-93. The system of conservation was described in the Annual Report for 1894-95. A record kept to determine the quantity of dung voided by cattle showed that a bullock produced 73 maunds of raw dung in the course of a year, exclusive of the excrement dropped while grazing or working in the fields. These results differ largely from those of a similar record made in 1894-95, which gave 46 maunds of dung, to each bullock per annum.

(7) *Distribution of seeds and implements.*—During the year, $22\frac{3}{4}$ lbs. of tobacco seed, $20\frac{1}{2}$ lbs. of Guinea grass cuttings and small quantities of other seeds were supplied to various parties from the stock of the farm. The implements sold by the farm were 14 Sibpur ploughs, one chaffcutter and one Baldeo plough.

(8) *Receipts and expenditure of the farm.*—The gross expenditure of the farm amounted last year to Rs. 3,917-11-4 against Rs. 2,268-10-8 in the previous year. The increase in cost was due mainly to the re-plotting of the farm and the laying out of new footpaths and ridges round the newly-made plots. The receipts amounted last year to Rs. 1,005-7-9 against Rs. 1,042-10-3 in the previous year.

Burdwan Farm.

41. As in the previous year, experiments were made in this farm with manures and implements, in methods of cultivation, and with varieties of crops. Cattle dung was conserved carefully in pits in order that the yield of an animal in a year might be ascertained. The distribution of seed and manures to neighbouring cultivators was made on a larger scale than in previous years.

(1) *Experiments with manures.*—The crops experimented with under this head were paddy, jute, sugarcane and potatoes.

Bonemeal and saltpetre gave excellent results with winter paddy, as it has done for the last six years. The outturn of grain by the application of this manure amounted during the year under report to 54 maunds per acre. The actual profit from a plot of nine cottahs manured with the above mixtures amounted after deduction of all expenses of cultivation, manuring, and harvesting to Rs. 17-14. The average amount of grain from the three unmanured plots with which the above manured plot was contrasted amounted only to 18 maunds per acre, and the actual profits from the three plots which measured 27 cottahs amounted to Rs. 27-11-6, *i.e.*, Rs. 9 from 9 cottahs. The application of bonemeal and saltpetre therefore really doubled the profits.

The results of the manure experiment with jute, which was made in duplicate, confirmed the experience obtained in previous years that cowdung is a better manure for this crop than castor cake, bonemeal, superphosphate, and saltpetre, and gives a better outturn. The seed used in the experiment was obtained from Sirajganj. Many cultivators in the neighbourhood of the farm have begun to grow this crop with seed supplied from the farm.

The best outturn of *gur* (66 maunds per acre) was obtained from the use of cowdung and super; cowdung by itself containing the same quantity of nitrogen yielded the next best results. Bonemeal came next in point of manurial value, and then bonemeal and cowdung mixed together.

The manure experiment with potatoes was designed to test the merits of cowdung, castor-cake and bonemeal. Last year and in the year preceding, cowdung yielded the highest outturn, but during the year under review castor-cake gave the best results. The outturn of potatoes from the plot manured with castor-cake amounted to 81 maunds per Bengal bigha, or about 240 maunds per acre. The outturn of the unmanured plot was only 28 maunds per Bengal bigha, or about 85 maunds per acre. The outturn was therefore raised nearly threefold by the use of castor-cake and the increase in outturn more than compensated for the extra cost of the manure.

(2) *Trials with improved implements.*—The Sibpur plough was tested against the ordinary country plough, but no conclusive results were obtained. The crop on which the experiment was made was paddy. The plots ploughed with the Sibpur plough showed only a nominal increase in the outturn.

An English chaffcutter was used with success for cutting up sugarcane leaves for a silo pit.

The working of the centrifugal sugar turbine was demonstrated on the farm, but it did not excite much interest.

The Behea 3 roller-sugarcane mill which has been in use for several years on the Farm continued to give satisfaction.

(3) *Experiments in methods of cultivation.*—The crops experimented with under this head were paddy, sugarcane and potatoes. In an experiment with paddy, in order to ascertain the effects of thick and thin sowing, it was found, as in the previous year, that there was no appreciable difference in the outturn. Thick sowing was made at the rate of 30 seers per acre and thin sowing at the rate of 15 seers per acre. The experiment started last year in order to ascertain the effects of the selection of paddy seed was continued during the year under report. There was a slight increase as in the previous year in the outturn from selected seed. The experiment must be continued for several years before any definite conclusions can be drawn.

With sugarcane, experiments were made to compare the merits of trench planting and the ordinary method of sowing and to test the effects of *ratooning khari* sugarcane. Trench planting as in all previous years gave better results. This method of planting now finds much favour with the Burdwan raiyats.

The *ratooning* of *khari* sugarcane was conducted successfully on one plot of the farm from the year 1887 to 1895, and it was found that this variety of sugarcane may be profitably *ratooned* up to the 5th or 6th year of harvesting.

On the recommendation of Dr. Leather, Agricultural Chemist to the Government of India, the *ratooning* experiment was renewed during the year under report, with the additional object of contrasting the results of *ratooning* with the results obtained from sowing annually. The outturn of *gur* obtained from the plot reserved for *ratooning* was about 7 maunds less per acre than the outturn of the contrasted plot. It remains now to be seen whether the *ratooned* plot will give an increased yield annually or not.

Two series of plots were utilized in an experiment with Naini Tal potatoes for testing the merits of whole tubers and cut sets for sowing. In the first series, the same number of cut sets and whole tubers were sown. Fifteen maunds per acre being the quantity of Naini Tal seed potatoes usually sown on the farm, when cut sets are used, potatoes at this rate were taken and cut up in two or three more pieces as necessary and sown in one plot. The pieces were counted, and the same number of whole tubers were taken and sown in the contrasted plot. The rate of sowing in the latter case amounted to 35 maunds 28 seers per acre. The outturn from the whole tubers amounted to 300 maunds per acre, and that from cut sets to 240 maunds per acre. Three hundred maunds per acre may be regarded as a record outturn. The financial results of the contrasted plots were about equal, both yielding after all costs of cultivation, seed, manuring, and harvesting a net profit of about Rs. 120 per acre. In the second series, the same weight of cut sets and whole tubers were used for sowing, viz., at the rate of 15 maunds per acre. The cut sets yielded 30 maunds more per acre of potatoes than the whole tubers, and yielded better financial results too.

(4) *Experiments with varieties of crops and new crops.*—These experiments were designed to ascertain the relative merits in points of productiveness of different varieties of paddy, sugarcane, and potatoes. Three varieties of coarse paddy were contrasted with three varieties of fine paddy. The best results were obtained from a fine variety known locally as *Bansmati.*

Two varieties of cane were grown on the farm in contrasted plots, viz., the local *Samshara* and the Poona variety. The latter yielded a higher outturn of *gur*. Cuttings of the Poona variety were obtained from the Sibpur farm, but Dr. Leather was not satisfied with the identity of the variety. Fresh canes were therefore imported from Poona for the current year's sowings. The results of the year under report with potatoes were in accord with those of previous years, and brought out the superiority of the Naini Tal variety.

(5) *Conservation of dung.*—The weighments recorded on the farm during the year showed that each bullock produced 6·1 seers of raw dung per day of 12 hours (*i.e.*, 12 hours during which the bullock was tied in the stall at night). Two cultivators in the neighbourhood of the farm conserve cattle dung in the same way as is done on the farm, and they have expressed satisfaction of the results obtained.

(6) *Distribution of seeds, manures, &c., to neighbouring cultivators.*—The work under this head was vigorously pushed on. During the year under report 134 cultivators purchased seed and manures from the farm Overseer against 92 in the preceding year. Considerable progress has been made since 1890-91, when only three cultivators obtained seed from the farm Overseer, and followed the improved methods of cultivation adopted on the farm. One hundred and twenty maunds of Naini Tal seed potatoes and 90 maunds of castor cake were sold to the raiyats in 25 villages. The cultivation of jute, *sorghum*, long-stemmed paddy, and fine paddy was also undertaken in several villages by cultivators working under the instructions of the farm Overseer, seed for the same having been supplied from the farm. Funds for the purchase of the above seeds and manures were advanced by the Department of Land Records and Agriculture, Bengal, and a seed shed is now under construction on the farm at the expense of the Agricultural Department for the careful storage of seeds and manures, implements, &c., to be supplied in future to neighbouring cultivators. Taking the average outturn of Naini Tal potatoes as tenfold of the seed sown (which is certainly not a high figure), no less than 1,200 maunds of Naini Tal potatoes were raised in Burdwan during the year through the efforts of the Assistant Director in charge of the farm and the farm Overseer. This may be regarded as very satisfactory.

(7). *Expenditure and receipts of the farm.*—The receipts for the year 1896-97 amounted to Rs. 1,632-3-6 against Rs. 1,017-3, the receipts of the year

1895-96, and the expenditure in 1896-97 amounted to Rs. 2,237-7-9 against Rs. 2,277-13-9, the expenditure of the preceding year. This shows a distinct improvement in the finances of the farm. The actual cost of cultivation during the year, exclusive of the salary of the Overseer and of a peon, and the expenses for stationery and stamps, amounted to Rs. 1,572-6.

Dumraon Farms.

42. The experiments at the old farm at Pareswana were transferred during the year under report to the new farm on the railway lines, and the former farm was put under ordinary cultivation. The experiments conducted at the new farm were the same as those conducted on the Burdwan experimental farm. Owing, however, to the drought of last year, and to the difficulty that was experienced in obtaining canal water for irrigation, the experiments with *aghani* crops were not successful. Some of them failed altogether, others were not instructive in their results. The sugarcane crop also suffered badly from want of irrigation, and the results obtained cannot be regarded as reliable, and need not therefore be reviewed here. A brief summary is given of the experiments with the cold-weather crops only. These experiments were made with wheat and potatoes, and were directed to ascertain the merits of different manures and of new agricultural appliances, of different methods of cultivation, and of different varieties of crops. The experiment in the conservation of dung could not be continued during the year owing to the absence of suitable pits on the new farm. A large number of sugarcane cuttings were purchased from the farm by neighbouring raiyats.

(1) *Experiments with manures.*—An experiment with wheat which was commenced in 1895-96 was repeated during the year under report, in order to ascertain the relative merits of the following manures:—Cowdung, ashes of cowdung, ashes of cowdung and saltpetre, bone-meal, nightsoil, town sweepings, and green manuring, viz., with kurthi (*Dolichos biflorus*) and sunn hemp (*Crotolorea juncea*). In both years cowdung gave the best results, and then ashes of cowdung and saltpetre. In 1896-97 the outturn of grain from the cowdung plot amounted to 1,710 lbs., or about 21 maunds per acre, and that from the plot manured with ashes of cowdung and saltpetre to 20 maunds (1,645 lbs.) per acre,—both very good yields. The average outturn of grain of the two unmanured plots amounted to about 1,125 lbs., or about 13½ maunds per acre. The net profit from the plot manured with cowdung, after deducting all costs of cultivation, manuring, and harvesting, amounted to Rs. 52 per acre, and that from the plot manured with ashes of cowdung and saltpetre to Rs. 32 per acre. The average net profit of the two unmanured plots was Rs. 31 per acre. Cowdung thus gave an increase in the outturn of 7½ maunds per acre, and in the net profit of Rs. 20 per acre. Ashes of cowdung and saltpetre, while giving a similar increase in the amount of grain produced, did not lead to equally good financial results.

Wheat was also experimented with in order to test the effect of cowdung manure on irrigated wheat. It would appear from the results obtained during the year under review and the year preceding that cowdung without irrigation does not improve the wheat crop very much. The increase in the yield from cowdung under such conditions amounted only to about 1 maund per acre in each year. The outturn of the plot manured with cowdung during the year under report was 10 maunds per acre only.

(2) *Trials with new agricultural appliances.*—The merits of the Sibpur plough were tested against those of the country plough, but the results were not conclusive.

Two threshing trials were made, viz. (1) between the country system of threshing and the Crosskill clod crusher used as a thresher, and (2) between these two and the Behea thresher. In the first experiment, the Crosskill worked for 5 hours 16 minutes and the country system of treading by bullocks lasted for 6 hours 17 minutes. The result as regards the separation of grain was the same in each case, but the Crosskill took one hour less time to thresh it, and the chaff produced was somewhat finer and softer than that produced by treading with bullocks. The second experiment also resulted in favour of the Crosskill roller. The chaff obtained from its use was softer than that obtained by treading and by the Behea thresher.

(3) *Experiments in methods of cultivation.*—The experiment made with Naini Tal potatoes in order to compare the merits of whole tubers and cutsets as seed brought out the superiority of whole tubers. Last year, the outturn from whole tubers was much heavier, but did not compensate for the increased cost in seed. During the year under report, the heavier outturn from whole tubers more than compensated for the increased cost in seed. The outturn from cutsets amounted to nearly 195 maunds per acre, and that from whole tubers to nearly 238 maunds per acre.

(4) *Experiments with varieties of crops.*—(*a*) *Wheat.*—The same ten varieties of wheat were tried during the last *rabi* season as in the *rabi* season of 1895-96, viz., two local varieties, two varieties from Muzaffarnagar, two from the Panjab, and four from the Central Provinces. The results obtained in the *rabi* season of 1896-97 were in accord with those of the previous year. The varieties from the Central Provinces gave poor results in both years. The Muzaffarnagar red wheat also gave inferior outturn in both years. The other varieties gave about equal results both in 1895-96 and in 1896-97 except the local red, which proved to be the heaviest producer during the year under report. The outturn of grain and straw of the different varieties during the last *rabi* season are shown below:—

Name of variety.	Yield per acre.	
	Grain.	Straw.
1	2	3
	Mds. srs.	Mds. srs.
Nane of Local white	17 37 (1,475lbs.)	22 19 (1,850lbs.)
„ red	20 34 (1,715lbs.)	30 27 (2,525lbs.)
Muzaffarnagar white	17 0 (1,400lbs)	30 20 (2,510lbs.)
„ red	11 24 (955lbs.)	21 37 (1,805lbs.)
Panjab white	16 33 (1,385lbs.)	27 16 (2,255lbs.)
„ red	16 23 (1,365lbs.)	28 30 (2,365lbs.)
Houra white of Central Provinces ...	11 36 (980lbs.)	17 1 (1,400lbs.)
Sconipissi white of „ „ ...	12 21 (1,030lbs.)	27 4 (2,230lbs.)
Katha red	6 8 (515lbs.)	20 22 (1,690lbs.)
Harda red	12 30 (1,050lbs.)	23 4 (1,900lbs.)

(*b*) *Potatoes.*—The merits of four varieties of potatoes were tested, viz., the Naini Tal, the Cherapunji, the Ghazipur and the Bettiah. The Naini Tal gave the best results, as will be seen from the statement below:—

Name of Variety.	Outturn per acre.
	Mds. Srs.
Bettiah	163 13 (13,475 lbs.)
Ghazipur	177 9 (14,585 lbs.)
Naini Tal	197 2 (16,215 lbs.)
Cherapunji	131 15 (10,810 lbs)

(5) *Conservation of cattle dung.*—Funds were not forthcoming from the Raj during the year under report for the construction of suitable pits, and this experiment had therefore to be abandoned.

(6) *Distribution of seed.*—There was a great demand for cuttings of the *khari* and other imported varieties of sugarcane. The number of cuttings of all varieties sold to the *raiyats* amounted to 167,200, *i.e.*, about 130 kahans.

(7) *Receipts and expenditure.*—The gross expenditure of the two farms at Dumraon and of the Economic Museum amounted during 1896-97 to Rs. 2,503 against Rs. 3,502, the expenditure incurred in the previous year, and the receipts to Rs. 1,283 against Rs. 867, the receipts of the previous year. The actual expenses of cultivation, inclusive of the salaries of watchers and peons, but exclusive of the salary of the Overseer in charge, amounted during the year to Rs. 947.

In the working of this farm also, the financial results show considerable improvement over those of last year.

Agricultural experiments and introduction of new and improved staples in Government Wards' and Private Estates.

43. For agricultural experiments and agricultural improvements in Wards' estates under Government management, the Board sanctioned an expenditure of sums aggregating Rs. 9,749. Sums allotted for expenditure on agricultural experiments and improvements in Government estates were not shown separately in the estimates for the year from sums allotted for miscellaneous improvements. The following is a brief account of agricultural experiments and introduction of new methods and staples undertaken, assisted, or encouraged by this Department during the year in Government estates, Wards' estates, and estates not under the management of Government officers:—

Burdwan Division.

44. *Private individuals.*—An account of the experiments undertaken by the raiyats in the neighbourhood of the Burdwan farm will be found in page 20 of this report. Babu Jogendro Nath Mitra, of Ajhapur, near Memari, in the district of Burdwan, who was supplied with Buxar wheat and 6 varieties of tobacco, viz., acclimatised Havana, Hingli, two varieties of Kaira and two varieties of Baroda tobacco, and also some Rhea roots, reports that Buxar wheat failed as in the previous year. The Baroda varieties of tobacco failed to germinate. Other varieties grew well. Rhea cultivation was not successful.

Bankura.—Private individuals.—Babu Raghunath Banerji, a zamindar of Kalikapur, in the district of Bankura, was supplied with Naini Tal seed potatoes and 4 varieties of tobacco. The outturn of Naini Tal potatoes amounted to 20 maunds per bigha, and that of tobacco to 7 maunds per bigha. The latter result may be considered satisfactory.

Hooghly.—Private individuals.—Babu Upendra Nath Banerji, of Uttarpara, undertook the cultivation of Naini Tal potatoes, but owing to late sowing the result obtained by him was not satisfactory, the outturn being only three-fold of the seed sown.

Presidency Division.

45. *24-Parganas.—Bhawanipur Wards' Estate.*—Potatoes were grown for the first time on a small scale in the Sundarban lot of the estate with success. The cultivation of jute and sugarcane has begun to a small extent in the Sundarban portion of the estates, and jute cultivation is becoming more popular.

Private estates.—Two varieties of castor were grown by the Superintendent of the Cossipur Practical Institution, viz., the country and up-country varieties. The land was manured with ashes and cowhouse refuse. The plants grew well, and the outturn was good, amounting to 5 lbs. of seed per plant in the case of the country variety and to 6 lbs. per plant in the up-country variety.

Babu Bhuth Nath Sett, of Calcutta, grew tobacco successfully at Lilloah from acclimatised Havana seed.

Nadia.—Naini Tal potatoes were cultivated at Natuda by Babu Naffar Chandra Pal Chowdry, a zamindar of the Nadia district. The results obtained by him were very encouraging. The outturn amounted to 53½

maunds per bigha, and the net profit from 1 bigha and 4 cottahs of land was Rs. 46. The manures used were indigo refuse and linseed cake.

Khulna.—Babu Rakhaldas Chakravarti of Bagerhat, who tried the cultivation of Naini Tal potatoes for the first time, reports that he was satisfied with the results obtained, and he proposes to grow the same variety of potato next cold weather.

Rajshahi Division.

46. *Dinajpur.—Maldwar Wards' Estates.*—Muzaffarnagar wheat, Naini Tal potatoes, and English vegetables were grown experimentally in the Maldwar Wards' Estates. The outturn of Naini Tal potatoes was rather poor, amounting only to mds. 22-10 per bigha. Muzaffarnagar wheat and English vegetables also gave poor results owing to the early cessation of the monsoon rains. Seed of Naini Tal potatoes was also distributed to the tenants of the estate, who grew them successfully.

Jalpaiguri.—Government Estates.—The cultivation of the Naini Tal variety of potatoes was continued in the Western Duars. During the year under report, 55 maunds of Naini Tal potatoes seed were supplied to the Deputy Commissioner for distribution in all the tehsils. Generally, satisfactory results appear to have been obtained. The Commissioner, Mr. Nolan, remarks that "the general report goes to show that the potato crop is finding much favour with the raiyats, and both the soil and climate are admirably adapted to its cultivation." Lieutenant-Colonel Evans Gordon, Deputy Commissioner, writes, "that it is hoped that at no distant date the cultivation of the crop will spread throughout the Duars, and the jotdars will provide themselves with their own stock of seed." The outturn of the crop was, however, not as good as that obtained in previous years owing to the failure of the rains.

Eighteen maunds of Muzaffarnagar seed wheat, 8 kahans of *khari* sugarcane cuttings and Rs. 30 worth of English vegetables were also supplied by this Department. The cultivation of wheat was not very successful. The experiment with English vegetables gave very hopeful results. The sugarcane cuttings were planted recently ; the results will not be known till next year.

Babu Nibaran Chandra Chowdhry, one of the Travelling Overseers of this Department who was sent to inspect the experiments in Jalpaiguri, has submitted the following report on the experimental cultivation of Naini Tal potatoes:— "The outturn of Naini Tal potatoes was not as good as that obtained in previous years. The soil of the Duars remains so moist in the cold season that no artificial irrigation is required for any cold weather crop. In other parts of these Provinces, the potato crop is irrigated at least once a week. The continued drought of the year, however, produced a lack of moisture in the soil. Insect pests also damaged the crops, and these two causes combined affected the outturn." Out of the 39 experiments made with Naini Tal potatoes, he found that in two cases the yield was ten-fold of the seed sown, and in other cases it varied from two-fold to eight times the seed sown. With regard to Muzaffarnagar wheat, the Overseer reports that although the outturn was small owing to the unfavourable character of the season, the quality of the wheat was very good. As in previous years, a vernacular leaflet containing simple instructions on the cultivation of Naini Tal potatoes, oats, barley, and English vegetables, and the use of bone manure was distributed among the *jotdars*.

Kumar Jogendro Deb Raiket, a zamindar of Jalpaiguri, undertook the experimental cultivation of Naini Tal potatoes in four different places. In two places, the outturn amounted to six times the seed sown. The potatoes were large and unaffected by disease. In two other places, the average outturn was only four-and-a half times the seed sown. The potatoes in this case were damaged to some extent by insect pests.

Darjeeling.—Government Estates.—Lucerne was grown with success at Kalimpong by the Deputy Commissioner of Darjeeling. Nepal chillies were also cultivated successfully at Kalimpong. Seed of this variety of chillies has been distributed to each *khas mahal* circle in Kalimpong for cultivation during the current year. It is reported that the produce was of two kinds, viz., red and yellow. The red chillies were appraised in Calcutta at Rs. 7-8 to Rs. 7-12 per maund.

Chittagong Division.

47. As reported last year, the Commissioner of Chittagong was supplied by this Department with seed of several varieties of tobacco, viz., *Hingli*, two varieties of *Kaira* and two varieties of *Baroda* tobacco, and with acclimatised exotic varieties, such as *Havana*, *Dindigal*, *Cuba*, *Rose muskatel*, and *Landreths*. The seeds were distributed by him in the different districts of his Division. The results are not known yet, as the leaves have not in all cases been gathered and dried, but the Commissioner reports that good outturns are expected. The curing of the leaves has been completed only in the Chittagong Hill Tracts, and samples of cheroots made by the hillmen after their own fashion have been sent by the Commissioner to this office. They will be appraised in due course.

The only other agricultural experiments made in Chittagong were with wheat, Naini Tal potatoes, English vegetables, and Nadia chillies. Wheat and Naini Tal potatoes gave poor results everywhere. The cultivation of English vegetables was very successful. Nadia chillies were grown with success for the fourth year. The General Manager, Wards' Estates, Chittagong, reports "that they are better than the country chillies, both in quantity and size."

Two new varieties of sugarcane, viz., the *khari* and *samshara*, have also been grown in the Noakhali Government estates. The results will be noticed in next year's report.

Patna Division.

48. *Shahabad.*—Messrs. Thomson and Mylne obtained some sugarcane cuttings from Poona for experimental cultivation at Beheea. They report that this variety of cane has succeeded beyond expectation, and they hope that the area planted with it will be considerably increased next season.

Gaya.—Tikari Wards' Estate.—The cultivation of the Cawnpore variety of sugarcane has been undertaken in the Tikari Wards' Estate. The crop is now standing on the ground.

Bhagalpur Division.

49. *Bhagalpur.—Government Estates.*—A sum of Rs. 47 was spent during the year under report in distributing Naini Tal seed potatoes among the raiyats. The results are not reported.

Sonthal Parganas.—Four varieties of tobacco were succesfully cultivated in the Madhupur farm, which belongs to Babu Hem Chandra Mitra, proprietor of the Cossipore Practical Institution. Three cottahs of land are reported to have produced about 1 maund of tobacco, *i. e.*, at the rate of maunds 6-26 per bigha.

Orissa Division.

50. *Cuttack.—Wards' Estates.*—In the Madhupur Wards' Estate, experiments were made with Naini Tal potatoes and *samshara* sugarcane. The experiment with Naini Tal potatoes failed owing, it is stated, to heavy rainfall in the month of January. Sugarcane was grown only with partial success.

Government Estates.—The cultivation of *khari* sugarcane was introduced in the Banki Government estate in the year 1893-94, by Mr. N. N. Banerjei, Assistant Director of this Department. Babu Horo Kumar Guha, Overseer of this Department, who went to Banki in December last, reports that many raiyats have adopted the cultivation of this variety of cane.

An experimental cultivation of Naini Tal potatoes, undertaken by Syed Nural Huq of Cuttack, failed for want of proper supervision.

Puri.—Government Estates.—Experiments with Naini Tal potatoes and with the Bombay, *samshara* and *khari* varieties of sugarcane were undertaken in the Government estate of Khurda. They were not successful, owing partly to the exceptional character of the year, and partly to other causes. The Subdivisional Officer of Khurda does not think that foreign varieties of sugarcane can be successfully introduced into the subdivision, but is strongly in favour of the cultivation of Naini Tal potatoes.

Chota Nagpur Division.

51. *Fodder and silo experiments at Ranchi.*—Reference was made in the last agricultural report to the fodder and silo experiments made at Ranchi under the supervision of Mr. A. Cooke, Manager of a tea garden at Palandu, near Ranchi. Mr. Cooke constructed another *kutcha* brick silo during the year under report, but the experiment failed as the walls split and let out the moisture. Mr. Cooke's trials showed that better ensilage may be made in a pit sunk below the level of the ground.

The following fodder grasses were grown by Mr. Cooke :—*Guinea grass*, *Polygonum Sachalinense*, *Lathyrus sylvestris*, and *Modeala recumbens*. *Polygonum sachalinense* did not grow freely, *Lathyrus sylvestris* failed, and *Modeala recum*, *bens* seemed too small to be of any value as a fodder plant.

Mr. Cooke has obtained the permission of the Superintendent of the Ranchi Jail to plant Guinea grass in the jail compound.

Experiments made by the Agricultural and Horticultural Society of India.

52. The Secretary to the Agri-Horticultural Society of India states that during the past year the seasons were most unfavourable for experiments of any kind. Under the head of "experiments, fodder, grain, fibre, &c.," the Secretary to the Society furnishes the following information:—

"*Cicer arietinum.*—Further sowings were made last season with acclimatised seed of the Spanish variety of gram, but the produce is now no way superior to the country kinds. There was a fair demand for white gram last year, but no results are reported.

Reana luxurians—teosinte.—Though experiments with this fodder were not continued last year, very favourable reports from various parts of the country are received. There can be no doubt that *teosinte* will be extensively grown. Two or three members intend to *silo* the stems this season.

Panicum jumentorum—guinea grass.—The demand for seed and offsets of this perennial fodder grass has increased considerably. The numerous experiments undertaken in different parts of India by Government and private individuals sufficiently confirm the general opinion as to the excellent feeding qualities of this grass.

Polygonum sachalinense—sacaline.—Most unfavourable reports as to the growth and hardness of *sacaline* have been received; in every instance the plants died down in the winter and commenced growth again on the approach of the hot weather. As to growth, the reports are that no progress has been made, the average length of stems being 2 feet. It is to be feared that *sacaline* will not prove of much use as a fodder in India.

Medicago sativa—lucerne.—The demand for seed has increased considerably during the past two years. Three new varieties were imported in 1896, viz., *Medicago sativa*, extra fine Italian, *Medicago sativa du Provence*, *Medicago sativa de Buenos Ayres*, but so far none of these have in any way proved superior to the ordinary lucerne in point of yield.

Trifolium incarnatum—crimson clover.—A quantity of seed was again imported in 1896, but I regret to say no reports are to hand. One member states that, owing to want of water, he could not sow any seed for experiment.

Lespediza striata—Japan clover.—No definite reports have come to hand as to yield of fodder. Germination of the seed was duly intimated, and result of cuttings is promised.

Sæedes—Ruta Bagas.—The Manager, Kajha Indigo Concern, Ghazipur, North-Western Provinces, reports that one bigha and-a-half of land was planted out and yielded over 50 maunds. Unfortunately no seed was saved.

Cyperus esculentus—Chufas.—A consignment of 5 pounds of seed nuts was received from Italy, and the entire quantity, with the exception of quarter pound was distributed, but unfortunately none of the nuts appear to have germinated. A further consignment is expected this year, and nuts will be distributed in famine-stricken districts.

Cassia neglecta—Prosapis edulis.—Seeds were again received from South American correspondents, but none germinated.

Pueraria thumbergiana—Kudzu.—A small quantity of this food plant was imported, but did not germinate. The fleshy roots are said to be eaten by Japanese of the poorer class.

Alectryon excelsum.—Two years ago, the late Baron Sir F. Von Müller, in forwarding a packet of seed of the above, drew attention to the fact that the produce of this tree was edible, and strongly recommended that an experiment be tried with seed sent. Two plants each 5 feet high are now growing fairly vigorously at the Society's Gardens.

Owing to the scanty showers in the rains, experiments of all kinds have proved most unsatisfactory. A large quantity of seeds of various kinds, notably buckwheat, *Atriplex numularia*, paddy, tobacco, wheat, and barley, &c., were distributed, but no results have yet, been received. Some of the above seed was also supplied to the Agricultural Department Bengal.

As regards fibres, plants and seeds, *Agave Americana*, rhea, sida, &c., were also distributed, but many regretted their inability to continue experiments owing to deficiency of water.

Experiments with Jadoo fibre are still being continued, and a quantity has been distributed among coffee, indigo, and tea planters.

The thanks of this Department are again due to the Society for the cordial co-operation and ready aid which has been rendered on several occasions during the year.

Trial of improved Agricultural Implements.

53. There is nothing special to report about the Sibpur and Baldeo ploughs and Beheea sugarcane mills which were supplied to different persons in previous years. The implements supplied during the year under report consisted of 13 Sibpur ploughs and 1 Baldeo plough. Reports of their working have not yet been received.

Supply of seeds, manures and implements.

54. The following is a list of seeds, implements, manures, &c., distributed by the Department during the year 1896-97 (exclusive of those used in the experimental farms):—

SEEDS.	MDS. S. CH.
Potatoes	375 10 0
Muzaffarnagar wheat	20 0 0
Buxar wheat	0 10 0
Paddy	7 5 0½
Jute	4 23 13
Barley	2 0 0
Maize	0 4 0
Rhea roots	0 20 0
Tobacco	0 11 0¼
Chinese cabbage	0 0 0$\frac{3}{10}$
Castor-oil seed	0 2 0
Groundnut	1 15 0
Arrowroot	2 20 0
American potato, peas, beans, maize, &c.	0 11 14½
Guinea grass seed	0 0 0¾
Lucerne seed	0 1 0
Country vegetable seed	0 5 7½
Reana luxurians	0 0 8
Sorghum	0 0 8
Guinea grass roots	0 5 0
Cotton	0 5 0
Biri kalai seed	0 15 0
	K. P.
Sugarcane cuttings	59 14
Rhea plants	...
Indian cotton	Seeds of 41 kinds of Bengal cotton.
	No.
Mahogany plants	12
	Value.
	RS. A. P.
English and country vegetables ...	72 4 9
IMPLEMENTS.	
	No.
Sibpur plough	13
Baldeo „	1
MANURES.	
	MDS. S. CH.
Castor cake	135 0 0
Bone meal	3 0 0

(a) Crop-cutting experiments by District Officers and Settlement Officers.

55. Returns of crop-cutting experiments for the year ending 31st May 1896 have been received from all District Officers except from those of Birbhum, Bankura, Hooghly, Nadia, Darjeeling, Purnea, and Champaran. In the case of the first six of the seven districts named, it is reported that no crop-cutting experiments were conducted during the year 1895-96. The return from Champaran is wanting; the returns received are being compiled in this office.

(b) Crop-cuttings in jail gardens.

56. A report on the result of 44 crop-cuttings made in jail gardens during 1895-96 was submitted to Government with this Department's letter No. 1730, dated 2nd November 1896. Returns of crop-cuttings in jail gardens in 1896-97 have been recently received in this office from the Inspector-General of Jails. A report on the result of these cuttings will be submitted separately to Government.

Enquiry in the flooded tracts in the Argoal Circuit in Midnapore.

57. It was noticed in the annual Agricultural Report of this Department for the year ending 31st March 1896, that Mr. N. G. Mukherji, Officiating Assistant Director of this Department, was deputed in 1896 to inspect the low-lying flooded tracts in the Argoal Circuit, in Midnapore district, with a view to ascertain whether the experimental cultivation of long-stemmed paddy should be continued in these tracts. Mr. Mukherji's report was submitted to the Board with this office letter No. 212, dated 11th February 1897, and copies were forwarded to the Commissioner of Burdwan and Collector of Midnapore for information. Mr. Mukherji's expectation, that the cultivation of long-stemmed paddy, undertaken in the Argoal Circuit during the year under review by this Department, would prove as unsuccessful as former experiments, has proved to be correct. From the reports received from the local officers, it appears that the experiment of last year failed owing to the sudden inrush of flood water; to high winds, which laid the crops low; to the attacks of crabs, which cut away the plants; and to damage done by birds. The in-rush of water really produced all the evils that followed. The results appear to support the reasons assigned by Mr. Mukherji for the failure. The seed cannot be sown in the land subject to floods until the early rains have washed away the saline incrustation, and the paddy plants cannot therefore make sufficient growth to resist the rush of flood water. Mr. Mukherji states that, in the opinion of the cultivators, the remedy for the deteriorated agriculture of this tract lies in the excavation of a canal through the lowest portion of the Argoal Circuit, which should run into the Pamsa *khal* on its south-east corner, and to this opinion Mr. Mukherji gives some support.

Enquiry into the agricultural condition of Satkhira, Nadia and Jessore.

58. In connection with the distress caused by failure of crops in the districts of Khulna, Nadia and Jessore, Mr. B. C. Basu, Assistant Director of this Department, was deputed, under the orders of the Bengal Government, to enquire into the outturn of crops and condition of the people in those districts. As the result of his enquiries, Mr. Basu submitted in December 1896 a report on the Sunderbans, in the Satkhira and Sadar subdivisions of Khulna, in which he described the manner in which the agriculture of that part of the country suffers from the incursions of salt water in years of short rainfall, and the incomplete protection from this danger which the existing system of embankments affords.

Sericulture.

59. The conduct of sericultural work, *i.e.*, work done under the supervision of this Department with the object of combating disease among silkworms and of producing healthy seed, was the subject of much correspondence during the year. It was laid down by Government in orders No. 893, dated 7th October 1896, that the object to be kept in view should be gradually to establish properly managed seed-rearing nurseries in every silk centre in Bengal. Government has sanctioned an annual expenditure

of Rs. 3,000 for the purpose. The working plan which it is proposed to follow in the next few years was described in detail in this office circular letter No. 25A., dated the 19th April 1897, addressed to the Collectors of the silk-growing districts. Under this working plan, which has received the approval of Government, the sericultural work in the Murshidabad district will remain in the hands of Mr. N. G. Mukherji, Deputy Collector, under the supervision of the Collector of the district, and the work in all other silk-growing districts has been placed under the control of the Assistant Directors of this Department.

During the first $4\frac{1}{2}$ months of the year under report, Mr. N. G. Mukherji was employed as Officiating Assistant Director of this Department. During this time, he was able to supervise the sericultural experiments in every silk-growing district where seed-rearing nurseries existed. On the return to duty of Mr. B. C. Basu, Assistant Director, on the 15th August 1896, Mr. Mukherji took privilege leave for three months, at the expiration of which he was posted as a Deputy Collector in the Murshidabad district, where he has continued to carry on sericultural work. Mr. Mukherji's report on the sericultural operations carried on during 1896-97 is printed as an Appendix to the report.

Ten seed-rearing nurseries in the silk districts were under the cognizance of the Department at the close of the year under report against nine in the previous year. Two new nurseries were established in the Murshidabad district towards the close of the year, viz, one at Balia and the other at Kandapara near Balia. One nursery, Batnagar, ceased to exist during the year in consequence of the illness of the seed rearer, and the appliances which had been lent to it were taken back. Another nursery, Garhbeta, was closed in consequence of the failure of the rearer to keep up his mulberry plantation, and the appliances lent to him were transferred to another cocoon-rearer living at Nipine, a village about six miles from Garhbeta. Since the close of the year, a new nursery has been opened at Bhalukgachi, an important cocoon-rearing centre in the Rajshahi district. The seed-rearing nursery at Pokhuria, in the Manbhum district, belonging to Rev. Mr. Campbell of the Sonthal Mission, is not under the supervision of this Department. The total quantity of cocoons raised in the ten seed-rearing nurseries during the year under report, so far as Mr. Mukherji has information, was 7,329 kahans against $6,451\frac{1}{2}$ kahans raised in the previous year; but only 1,056 kahans of cocoons, equivalent to about 3,200 ounces of eggs, were sold for seed against 1,331 kahans of cocoons, equal to about 4,000 ounces of eggs, sold in 1895-96. The cause of the falling off in the sale of seed, which is the criterion of success, is attributed by Mr. Mukherji to the failure of the central nursery at Chaltia to supply seed to the out-stations, and to deterioration of the Chaltia stocks during his absence on leave from the 16th August to the 5th November. The excessively dry character of the last cold weather, which checked the growth of mulberry, and thus put a stop to cocoon-rearing in many places, is believed to be partly accountable also for the smaller sale of seed cocoons last year.

During the year under report, Mr. Mukherji made an investigation of the destruction of silkworms which was caused in certain villages in Murshidabad by the beetle *Dermestes vulpinus*, which is known to infest cocoon-godowns, but was not hitherto known to possess the power of destroying live silkworms. Mr. Mukherji thinks that the plan of seeding and rearing which he has introduced into the experimental nurseries affords complete protection from the beetle.

Mr. Mukherji's Bengali Manual of sericulture was translated by him into English. The official publication of the English version was sanctioned by Government last year. The printing of the book has not been completed in consequence of delay in engraving the woodcuts, with which the manual is to be illustrated; but it is hoped that it may appear shortly.

CHAPTER VI.

AGRICULTURAL EDUCATION.

60. The subject of Agricultural education received some attention during the year. The Agricultural Conference, which was held in Calcutta in the cold weather of 1895-96, recommended (1) that the course of study in primary and middle schools should be so revised as to include a graduated series of

lessons in agriculture, and in other subjects of elementary science; (2) that agricultural classes should be opened in connection with the Sibpur Civil Engineering College; and (3) that encouragement should be given to special agricultural education by allotment of a certain number of appointments in the public service to students who have received such instruction. The Bengal Government has accepted these recommendations, and has asked for the sanction of the Government of India to the early formation of agricultural classes at Sibpur. Details of the scheme for opening agricultural classes at Sibpur, and of proposals for preparation of agricultural chapters in text-books for primary and middle schools, were worked out during the year.

61. *(b) Bengal Veterinary School.*—An account of the work of the Veterinary School at Belgatchia has been separately submitted to Government.

CHAPTER VII.

Publication of agricultural information.

62. The following forecasts of harvests, special reports of crops, agricultural statistics, bulletins and other agricultural reports, were prepared and published by this Department during the year under report:—

(1) Forecasts of the outturn of *rabi* crops of 1895-96.

(2) Preliminary and final reports of the *bhadoi* crops of 1896.

(3) Preliminary and final estimates of the winter rice crops of 1896.

(4) A final estimate of the wheat crop of 1895-96, and first forecast of the outturn of the wheat crop of 1896-97.

(5) Preliminary and final forecasts of the jute crop of 1896.

(6) A final forecast of the oilseed crops of 1895-96, and a first forecast of the oilseed crops of 1896-97.

(7) Report on the early and late cotton crops of 1896-97.

(8) Report on the indigo crops of 1896.

(9) Tables of agricultural statistics for 1895-96.

(10) A list of agricultural implements and machines which were tested during the year 1896, and of those in use which were reported to have met with more or less marked success during the year.

About 880 copies of each of the crop forecasts mentioned above were printed and distributed for the Department by the Officer in charge of the Bengal Secretariat Book Depôt in accordance with the distribution list of crop forecasts prescribed by the Government of India's Circular No. $\frac{2}{19}$, dated 25th January 1895. Some copies were also distributed by this Department. Six hundred copies of the agricultural statistics of 1895-96 were printed and distributed by the officer noted above in accordance with the distribution list of agricultural notes and pamphlets.

The following bulletins and roports were also issued during the year:—

(1) Bulletin No. 2 of 1896—List of the principal crops grown in Bengal.

(2) Bulletin No. 3 of 1896—Note on the races of wheat cultivated in Bengal by Surgeon-Major D. Prain, Curator of the Herbarium, Botanical Gardens, Sibpur, Calcutta.

(3) Monograph on "Dyes and Dyeing in Bengal" by Mr. N. N. Banerjei, Assistant Director of the Department of Land Records and Agriculture, Bengal.

Six hundred copies of each of the above bulletins and reports were printed for distribution. They may be purchased at the Secretariat Book Depôt.

CHAPTER VIII.

FINAL.

Emigration to Burma.

63. The British India Steam Navigation Company continues to convey deck-passengers certified to be "State emigrants" from these Provinces from Calcutta to Rangoon at Rs. 5 a head, instead of the usual fare of Rs. 10, and the Bengal Government pays to the Company a subsidy of Rs. 2-8 per head for each "State emigrant" so conveyed, subject to a maximum of Rs. 1,000 per annum.

The Managing Agents of the Company report on the subject of emigration from Bihar to Burma during the year as follows: "In 1895, only 136 emigrants travelled in four steamers. From April 1896 to March 1897, inclusive, five steamers left conveying 241 souls, all from the same district; and it appears that the benefits of this emigration, though put before the people, does not appeal to them much. There has been no hitch or trouble over the conveyance of the men, who have expressed themselves satisfied with all the arrangements made for their welfare."

In paragraph 3 of Government Resolution No. 847T.R., dated 5th October 1896, it was directed that an attempt should be made to ascertain the cause of the decrease in the number of persons who emigrated from Bihar to Burma during 1895-96 as compared with the number who emigrated in 1894-95. Accordingly, the Collector was requested to favour this Department with a report as to the cause of the decrease, and as to whether anything more can and should be done by Government to encourage emigration to Burma from the Shahabad district.

In reply, the Collector of Shahabad has forwarded a letter, dated 25th January 1897, from Mr. Ernest Mylne, of Jagadispur, the grantee of waste land in Kyontaga, in the district of Shegywin, Burma, together with copy of a note drawn up by the late Mr. James Mylne. A copy of these papers was submitted to Government with this office letter No. 17T.A., dated 20th May 1897. Mr. E Mylne has proposed that Government should advance sums aggregating Rs. 33,050 without interest during the next three years to enable 50 families containing 200 adult "units" to settle on his grant in Burma, and the firm of Messrs. Thomson and Mylne undertake to manage the expenditure, to send accounts and receipts, and to endeavour to recover the advance. The Collector, Mr. Windsor, is of opinion that it would not be advisable for Government to make advances of this nature. Mr. Windsor points out, that the amount required is very large, considering the number of persons to be affected, and that there might be serious difficulties in recovering the money. Mr. Macpherson has expressed his agreement in Mr. Windsor's opinion, that Government should not do more than pay a proportion of the cost of conveying emigrants to Burma, and that the initial expenditure of settling and maintaining them there should be left to the emigrants themselves or to the grantees of waste lands. There are now 800 cultivating emigrants on Mr. Mylne's grant from the Shahabad district. The Collector reports, that he could not obtain any information regarding emigration of Bihari cultivators to the late Rai Jai Prokash Lal Bahadur's grant of land in the district of Toungoo in Burma.

Agricultural Exhibitions.

64. Agricultural exhibitions were held during the year under report at Suri in Birbhum, at Cossipore near Calcutta, at Hatchapra in Nadia, at Kalimpong, at Alipore and Falakata in Jalpaiguri, at Rukundipur in Bogra, at Barhampur in Shahabad and at Sonepur in Saran. Of these, the exhibitions mentioned in the margin were assisted with the grants of money noted out of this Department's allotment in aid of public exhibitions and fairs. The other exhibitions did not receive any Government subsidy. A brief notice of each of these exhibitions and fairs is given below.

	Rs.
Barhampur	150
Sonepur	125
Kalimpong	500
Alipore and Falakata ...	500
Rukundipur	200

65. *Barhampur Agricultural Show.*—The Barhampur Agricultural Show, in the Shahabad district, was held for the fourth time on the 1st, 2nd and 3rd March 1897 during the *Fulguni mêla*, where a large number of cattle and horses were brought for sale, attracting a large number of people from the neighbouring country. The Agricultural Show was arranged by a Committee of Management under the presidency of Mr. C. R. Marindin, C.S., Magistrate and Collector of Shahabad. It was divided into four sections, comprising exhibits of cattle, agricultural produce, vegetables, fruits and flowers, and agricultural implements. Veterinary Captain Raymond, Superintendent of the Civil Veterinary Department, who attended the show, reports that the total number of cattle, ponies and horses present were as follows:—

18,662 cattle. | 459 horses. | 1,330 ponies.

Veterinary Captain Raymond remarks, that the cattle as a whole were not quite as good, nor in such condition, as those he saw at Sonepur. The horses were bad in quality, and there were not many that would have suited native cavalry, and none that would have done for European cavalry. A few fair 14-hand ponies were offered for sale at prices from Rs. 210 to Rs. 250; but the majority of the animals were small, and some of these were in miserable condition. A large number of good medium-sized bullocks were brought to the fair for sale.

In the Agricultural Section, the exhibits consisted of specimens of grain, millets, pulses, oilseeds, country vegetables and implements. There was an increase in the number of exhibits of agricultural produce as compared with last year. Special prizes were awarded to the exhibitors of Muzaffarnagar wheat. There were 280 exhibits of vegetables, fruits, and flowers against 200 in the last year. Ninety agricultural implements were exhibited this year against 52 in the last year. Messrs. Thomson, Mylne and Burrows of Beheea exhibited a sugarcane press, a centrifugal sugar separator, and a threshing machine. The implements exhibited by the firm attracted the notice of a large number of people. The Overseer of the Dumraon Farm supervised the arrangements in the Agricultural Section, and also brought to the show several agricultural exhibits produced on the Dumraon Farm.

66. *Sonepur Fair.*—The Sonepur Fair is probably the most important cattle and horse fair in these Provinces. It was held last year from the 18th to the 26th November 1896, and Veterinary Captain Raymond, Superintendent of the Civil Veterinary Department, Bengal, who visited the fair, estimated the number of animals brought to the fair as follows :—2,700 horses and ponies, 35,000 bullocks, 500 cows, 300 elephants and a few buffaloes and camels. The judges of live-stock were of opinion that fewer good horses and ponies were brought to the fair than usual. The best horses and ponies are reported to have been brought from Saharanpur, Kurnool, and Meerut. Nearly all the good ponies were bought before the fair closed. Veterinary Captain Raymond states that 95 per cent. of the horses which he saw were in good condition. A larger number of cattle were exhibited than usual ; 98 per cent. of these were in good condition. Eight countrybred horses were purchased at the fair for the 3rd Bengal Cavalry and seventeen bullocks were purchased for the Commissariat Department, Allahabad. The lighter kinds of draught cattle were dearer than was anticipated, and many, therefore, were taken back from the fair unsold. The milch-cows were poor in quality. Prices were awarded for cattle only.

67. *Kalimpong Fair.*—The Kalimpong Fair, in the Darjeeling district, which is mainly an exhibition of live-stock, was held last December. Veterinary Captain Raymond, Superintendent of the Civil Veterinary Department, Bengal, who attended the exhibition, reports that 240 mules were present on one day of the exhibition. Government offered Rs. 500 in prizes for mules: a portion of this amount to be awarded for mules fit for artillery purposes, and the other portion for mules suitable for Commissariat purposes. In the artillery class, only one prize was awarded, and seven prizes were given for Commissariat mules. About 68 Bhutia ponies were brought to the show; it was said that these were not as good as those brought to the show last year. Cattle were better both in quantity and quality than in the previous year.

68. *Alipur and Falakata Fairs.*—As stated in previous reports, the Alipur and Falakata Fairs are intended to stimulate trade with Bhutan. The fair held at Alipur last year lasted from the 25th January to the 6th February 1897. It was attended by Bhutia traders, who brought in their country products consisting chiefly of blankets, yaktails, ponies and dogs. It is reported, that the attendance, as well as the sales, declined this year owing to bad harvests. Sales were estimated to have been made to the value of Rs. 3,000 to Rs. 3,500 in the year under report, against Rs. 4,395 in the last year. The Falakata Fair lasted from the 6th February till the 2nd of March 1897. Agricultural products, such as jute, tobacco, paddy, &c., were exhibited, and some prizes were awarded. The value of the sales amounted to Rs. 6,000, exclusive, the district report says, of prices realised from sales of grain, rice, &c., which, if included, would double the amount, against Rs. 34,500 in the previous year.

69. *Rukindipur Fair.*—The Annual Fair at Rukindipur, in the Jaipur Government Estates, in Bogra, was held from the 19th to 21st November 1896. A considerable number of agricultural products were exhibited, and prizes were awarded.

70. *Cossipore Exhibition.*—The Cossipore Exhibition, which has been held for the last seven years at the Seven Tanks garden in Calcutta, was held for the first time at Madhupur, on the East Indian Railway line, on the 27th and 28th of February. Babu Hemchandra Mitter, the President of the Cossipore Practical Institution, has a small farm at Madhupur, where he is making a few agricultural experiments with the ultimate object of inducing the neighbouring cultivators to grow new crops and to adopt better methods of cultivation. Although the exhibits were naturally fewer at Madhupur than those sent in former years to Cossipore, they attracted a large number of cultivators, all of whom showed great interest and curiosity in such of the exhibits as appeared to be superior to their own productions.

The agricultural exhibits consisted of paddy, maize, jute, cotton, tobacco, pulses, oilseed, English and native vegetables, cart and plough bullocks, bulls, cows, butter, ghee and a few agricultural implements. Besides these, fruits and flowers played an important part in the exhibits. Edible and industrial jungle produce were also on show. Mr. Banerjei, Assistant Director, attended the exhibition, and showed products of the Burdwan experimental farm, and addressed the cultivators.

71. *Hatchapra Exhibition.*—An agricultural and industrial exhibition under the management of the Reverend Mr. I. W. Charlton, a resident European Missionary, was held at Hatchapra, in the Nadia district, from the 11th to the 15th January 1897. Babu Nibaran Chandra Chowdhry, Travelling Overseer of this Department, who attended the exhibition, reported that it was well attended, but that the articles exhibited this year were not as good as those shown last year. In the agricultural and industrial sections altogether 526 articles were exhibited against 600 in the previous year, of which about 250 were of a purely agricultural character against 331 in the previous year. The decrease in the agricultural exhibits was due to the unfavourable character of the last *rabi* season. Rupees 325 was distributed in prizes in the Agricultural Section.

The centrifugal cream-separator, the Sibpur plough, and the American hoe were shown at work by the Overseer of this Department. The preparation of cream and butter by means of this separator attracted considerable notice.

72. *Suri cattle fair.*—With a view to improve the cattle in the district of Birbhum, which are poor in quality, a cattle fair was held at Suri from the 18th to the 20th January 1897, under arrangements made by the Officiating Collector, Mr. Drake-Brockman. Veterinary Captain Raymond, Superintendent of the Civil Veterinary Department, Bengal, who was present at this fair, estimated that about 5,000 people attended it. Bulls, bullocks, cows, sheep and goats were exhibited at the fair to the number in all of about 500 animals. Thirty-three prizes in money to the amount of nearly Rs. 300 were awarded. The cows exhibited varied in height at the shoulder from 34″ to 44″; most of them were a good deal below 44″.

Applications for patents for inventions.

73. Eleven applications for patents of an agricultural character were received during the year under review from the Government of India, in the Revenue and Agricultural Department, for report. These applications were for patents connected with the extraction of oil, flour, corn and fibres, cleaning and separating cells of seeds, improvements in retting or steeping jute, presses for packing and baling cotton and other articles, a baling press and a silk-winding machine. The applications were sent to the Secretary to the Agri-Horticultural Society of India, who obtained the opinion of Mr. H. J. K. Green, member of the Institute of Civil Engineers, upon them.

Director's inspections of work in connection with record of prices-current and price list under the Bengal Tenancy Act.

74. During the year under report, Mr. Macpherson examined the general prices-current returns as well as the register and returns of prices of staple

food-crops maintained under the Bengal Tenancy Act in the districts of Backergunge, Tippera, Cuttack and Noakhali. Copies of his inspection notes, written in the three last-named districts, were submitted to the Board and to the Commissioners and Collectors of the districts concerned. A list of notifications published in the *Calcutta Gazette* by the Government of Bengal giving average prices of staple food-crops in local areas prepared under section 39 (5) of the Bengal Tenancy Act, VIII of 1885, for each of the years 1887 to 1895 was prepared in this office and forwarded to all District Officers and officers in charge of settlement under the Director's control as likely to prove useful in Settlement work.

Cost of agricultural experiments.

75. Excluding the cost of the experimental work done in combating with silkworm disease, the cost to Government of agricultural experiments and enquiries conducted under the direct supervision of the Department of Land Records and Agriculture during the year under report was Rs. 10,353-15-3 against Rs. 9,287-6-5 expended in the preceding year. The details are as follows :—

		Rs.	A.	P.	Rs.	A.	P.
1.	Maintenance of the Sibpur Farm				3,890	11	3
2.	Experiments other than those made in experimental farms ...				4,013	5	9
	(*a*) Purchase of seed potatoes	2,034	8	0			
	(*b*) Ditto of Muzaffarnagur seed wheat ...	146	10	2			
	(*c*) Purchase of long-stemmed paddy seed ...	171	8	4			
	(*d*) Cost of sugarcane crushing experiments ...	118	8	0			
	(*e*) Cost of cattle shed	134	7	0			
	(*f*) Cost of a store shed	214	3	6			
	(*g*) Ensilage experiments	13	14	0			
	(*h*) Purchase of other seeds, manure, &c. ...	1,179	10	9			
		4,013	5	9			
3.	Pay and travelling allowance of agricultural overseers ...				1,327	2	6
4.	Cost of exhibiting implements and machines at Agricultural Shows				75	0	9
5.	Purchase and repair of implements				167	6	9
6.	Cattle-breeding				237	2	3
7.	Plans, wood-cuts and maps for the Cuttack Agricultural Report by Mr. N. N. Banerjei, for the plan of the Sibpur farm and for the handbook on sericulture by Mr. N. G. Mukherji ...				458	7	0
8.	Miscellaneous				184	11	0
	Total ...				10,353	15	3

This does not include the pay of the Assistant Directors or of the correspondence and statistical clerks employed in the Agricultural Branch of the Director's office.

Officers of the Department.

76. Mr. Bhupal Chandra Basu, Assistant Director, rejoined from leave in August 1896. He supervised the Sibpur Farm and sericultural experiments in all the silk districts except Murshidabad, and was to a great extent responsible for the statistics and forecasts issued by this Department. He performed these duties with ability, zeal and accuracy. Mr. Banerjei, Assistant Director, was in special charge of the Dumraon and Burdwan farms, and shared with Mr. Basu the miscellaneous work of the Agricultural Department. His work reached a high standard of intelligence and efficiency.

I have the honour to be,

SIR,

Your most obedient servant,

C. G. H. ALLEN,

Offg. Director of the Department of Land Records and Agriculture, Bengal.

APPENDIX I.

No. 398G., dated Berhampore, the 5th June 1897.

From—E. V. LEVINGE, Esq., Collector of Murshidabad,
To—The Director of the Department of Land Records and Agriculture, Bengal.

IN reply to your letter No. 595A., dated 8th April 1897, and its subsequent reminders, I have the honour to submit herewith a copy of a short report by Mr. N. G. Mukherji on the sericultural experiments for 1896-97, and to explain that Mr. Mukherji was unable to furnish this report earlier owing to pressure of work in connection with famine.

REPORT OF THE SERICULTURAL EXPERIMENTS IN MURSHIDABAD FOR 1896-97.

THE sericultural experiments in Murshidabad were conducted under my supervision during the year under report except for about three months, when I was on leave.

The experiments were conducted at four centres, viz., at Berhampore, at Chaltia, and at Balia and Kandapara.

A.—BERHAMPORE.

The work done at Berhampore is comprised under the following heads:—

(*a*) Conduct of special experiments,
(*b*) Training of apprentices, and
(*c*) Examination of samples of cocoons from the nurseries in the different silk districts.

(*a*) *Special experiments.*—Two special experiments were conducted during the year. The first had reference to a wholesale destruction of silkworms in several villages from Bhabta to Beldanga, apparently caused by the ordinary *dermestes velpinus*. This beetle has always been known to infest cocoon-godowns and to feed on dead chrysalides and moths, but that they had the power to effect wholesale destruction of live silkworm had never been suspected. The two most natural suppositions were either (1) that this was a different species of *dermestes* that fed on live silkworms, or (2) that the silkworms had been dying of disease, and that the ordinary *dermestes vulpinus* were only feeding on the dead carcasses of the worms. Every rearing-house I visited, showed numerous *dermestes* at all stages, burrowed under the litter on rearing trays. The miscroscope showed *pebrine* corpuscles in every worm that was examined. The second supposition, therefore, seemed at first the more probable of the two. But actual experiment showed that it was the ordinary *dermestes vulpinus* of cocoon-godowns that was feeding on the worms, and that had proved destructive to worms of several villages during the last November *bund*. Two lots of silkworms were taken and some ordinary *dermestes*, beetle and larvæ brought from a godown in the Babalbona silk factory were kept with them under two covers. When watched, the beetles and the larvæ were found to be extremely shy about attacking the silkworms; but under cover they readily attacked them, as they readily disappeared or got killed when they were kept with the *dermestes*. One day, the two lots of silkworms were kept with the *dermestes*, and for two days they were kept apart from the *dermestes*. This treatment was repeated until, out of several hundred silkworms, only three remained to spin cocoons. During those days, the silkworms were kept apart from *dermestes*, and there were no deaths nor disappearances. The dead worms examined under the miscroscope did not always show germs of disease. These were conclusive proofs that the ordinary *dermestes*, both in the imago and larval stages, are capable of effecting wholesale destruction of silkworms.

The only source of *dermestes* in a rearing-house is the seed-cocoons. With them, eggs and larvæ of this insect come in greater or less abundance into the rearing-house. The larger the proportion of dead chrysalides among a lot of seed-cocoons, the greater is the chance of a large number of *dermestes* coming with them. The seed-cocoons imported into the villages alluded to during the last November *bund* must have contained a large proportion of dead chrysalides. That every worm examined in the affected houses showed pebrine corpuscles is a sure indication that the seed was extremely poor, and that a large proportion of the seed-cocoons never produced living moths, but harboured dead chrysalides which were sought by the *dermestes*.

The plan of seeding and rearing I have introduced in the experimental nurseries, does away with all possibility of access of this pest into the rearing-house. The seeding is done in a separate room, and on sheets of paper which are washed in a sulphate of copper bath before the eggs are taken into the rearing-house. The eggs of *dermestes* are loose and soft bodied substances which cannot remain adherent to the sheets of eggs after they have been taken out of the sulphate of copper bath. The rearing-house is also fitted with wire gauze

sashes which exclude the *dermestes* along with the parasitic fly. Unnoticed, the *permestes* must always have caused some little harm to village rearings, and that they are capable of doing harm on an extensive scale was abundantly obvious during the last November *bund.* To the category of the enemies of silkworms should therefore be added the *dermestes*, and the means of avoiding loss from this source kept in view of cocoon-rearers through educational and other methods that may be adopted by Government in its efforts to revive the sericultural industry of this Province.

The other experiment had reference to the rearing of European silkworm eggs sent to me by the Agricultural Department. The quantity was too large for experiment at Berhampore under existing arrangements. So I distributed the seed among several parties—(1) the Director of the Silk Department of Kashmir, (2) the Manager of Lister's grant, Dehra Dun, (3) Ray Radha Kishore Koul Bahadur of Lahore, and (4) Pandit Darshan Lal Dobe of Kalakankar, Oudh. The hibernation of the different lots of seed took place in different stations, viz., at Darjeeling, Mussoorie, Dalhousie and Srinagar. Only ½ ounce was reared at Berhampore. The hatching of the eggs took place most unevenly, and every moth from the cocoons that were formed afterwards showed pebrine corpuscles. The seed was not only diseased, but the manner of conservation or despatch affected its value most materially. All my previous experiments in the rearing of European silkworms, showed that even hatching and successful results could be attained in this country. The seed that was sent to me by the Agricultural Department was therefore particularly poor.

(*b*) *Training of apprentices.*—The following persons were in training at Berhampore during the year :—

1. Pandit Darshan Lal Dobe, Saidapet Graduate.
2. Pandit Kishna Gobind Sant, Saidapet Graduate.
3. Amar Singh from Baroda estate.
4. Raghunath Das of Balia, near Kandi, Murshidabad, professional cocoon-rearer.
5. Shashi Bhusan Das of Kandapara, also near Kandi, professional cocoon-rearer.
6. Babu Pramatha Nath Chatterji of Calcutta.
7. Babu Gokul Chandra Sinha of Balia (Kandi).

The first named gentleman is carrying on the experiments successfully in the estate of the Honourable Raja Rampal Singh of Oudh. The next two are employed in the Baroda estate. I have no information as to their progress. Shashi Bhusan Das and Raghunath Das have been helped to establish independent nurseries of their own in the Kandi subdivision of this district. The other two apprentices are not sufficiently well trained as yet. Babu Gokul Chandra Sinha was sent to officiate for a few months as the Sericultural Assistant Overseer in Midnapore. There he utterly failed to carry on the work which had been successfully inaugurated by his predecessor. Babu Pramatha Nath Chatterji has been recently appointed in charge of the Chaltia Nursery as the fittest person available under the existing *regime*, and it is only hoped that his inexperience will be compensated by his intelligence and the interest he takes in the work of the nursery. The removal of the head-quarters of the Travelling Overseer from Berhampore to Calcutta has disturbed the arrangement for the training of apprentices. It will be sometime yet before the present overseer, who is in charge of the Chaltia Nursery, attains sufficient experience to be able to teach professional cocoon-rearers successfully rational methods of sericulture.

It was never intended to keep the Travelling Overseer in Calcutta. His duty is to move about in the silk districts.

3-7-97. (Sd.) C. G. H. ALLEN.

(*c*) *Examination of samples.*—The following table summarises the results of the examination of samples from different nurseries :—

	Name of Nursery.	April.		May.		June.		July.		August.		September.		October.		November.		December.		January.		February.		March.	
		Percentage of pebrine.	Number of cocoon shells in 1 tola.	Percentage of pebrine.	Number of cocoon shells in 1 tola.	Percentage of pebrine.	Number of cocoon shells per tola.	Percentage of pebrine.	Number of cocoon shells per tola.	Percentage of pebrine.	Number of cocoon shells per tola.	Percentage of pebrine.	Number of cocoon shells in 1 tola.	Percentage of pebrine.	Number of cocoon shells per tola.	Percentage of pebrine.	Number of cocoon shells per tola.	Percentage of pebrine.	Number of cocoon shells per tola.	Percentage of pebrine.	Number of cocoon shells per tola.	Percentage of pebrine.	Number of cocoon shells per tola.	Percentage of pebrine.	Number of cocoon shells per tola.
1		2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
Murshidabad.	Chaltia	Nil	120	Nil	154	Nil	96	2% Nil	104 80	3%	144	...	...	? ?	112 120	65% 100%	112 128	...	...	5% 2%	120 108	...	...	2%	96
	Balia	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	2%	104
	Noadapara in Rajshahi...	...	...	...	...	...	...	4½%	...	Nil	128	?	120	...	...	...	...	100%	144	...	...	...	...	Nil	144
	Garhbota in Midnapore...	...	...	...	...	...	...	Nil	138	Nil	128	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Birbhum.	Duna	...	...	3%	95	2%	120	3% 3%	116 122	1½% 5%	118 108	...	...	50% 33%	? ?	...	...	...	...	...	...	...	...	2%	?
	Bathagar	...	..	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
Malda.	Kagachira and Araidanga	Nil	138	3%	142	?	132	10% 10%	132 130	8%	130	...	...	15%	128	...	...	...	...	2½%	128	...	...	5% 1½%	142 132
	Jot	...	...	...	...	...	...	...	...	...	...	1% 1%	91 90	...	...	1%	136	...	...	...	...	1%	126	...	...
	Birampur	...	...	...	...	Nil	128	...	5%	126	...	...	...	...	...	6%	144	...	...	9%	112	...	...	...	...
	Mehedipur	...	...	...	...	1½%	128	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...

LIBRARY OF THE BOMBAY BRANCH OF THE ROYAL ASIATIC SOCIETY.

The above table shows that samples were received very irregularly from the different stations. This is also partly to be accounted for by the fact that the work remained in abeyance in many nurseries during the year owing to the changes made in the arrangements under which the experiments have been carried on since August last.

The following table shows the progress of the experiments in the nurseries since last year :—

	Name of Nursery.	Quantity of cocoons raised.		Quantity of cocoons sold for seed.		Number of crops taken.	
		1895-96.	1896-97.	1895-96.	1896-97.	1895-96.	1896-97.
	1	2	3	4	5	6	7
		Kahans. Puns.	Kahans. Puns.	Kahans. Puns.	Kahans. Puns.		
1	Chaltia	225 0	134 4	105 0	117 5	9	13
2	Balia	Nil	30 0	Nil	Nil	Nil	1
3	Noadapara	153 0	264 5	110 0	80 0	5	4
4	Garhbeta	244 0	100 6	103 8	61 0	5	2
5	Kagachira and Araidanga.	2,051 0	2,048 8	132 0	231 6½	9	10
6	Jot	1,644 8	2,258 0	156 8	25 0	8	7
7	Birampur	708 0	1,295 0	30 0	170 0	5	5
8	Mehedipur	677 0	412 0	199 8	62 0	7	1
9	Duna	527 8	618 8	375 8	192 8	7	9
10	Batnagar	221 8	168 0	119 8	117 0	3	4
	Total ...	6,451 8	7,328 15	1,331 8	1,056 3½	58	56

The following figures give at a glance an idea of the progress of the experiments during the last six years :—

Year.	Total quantity of seed sold in ounces.
1891-92	1,035
1892-93	1,900
1893-94	2,134
1894-95	2,388
1895-96	4,500
1896-97	3,200

The progress of the experiments which were steadily progressing thus received a check during the year under report, and the deterioration, as may be inferred from a study of the last three tables, has been most marked in the direction of distribution of healthy seed, which is the main aim of the experiments. The distribution of healthy seed implies exchange of seed among the different nurseries, as well as the keeping up of seed out of season under proper supervision at some central nursery, to which all the nurseries look for supply at each change of season, when the *nistari* variety of silk-worms has to give place to the *Deslu* or *vice versâ*. This matter has been already represented to the Agricultural Department from other sources, and I only repeat it to give emphasis to this representation.

B.—The Chaltia Nursery.

This is the only demonstration nursery conducted entirely at Government expense. Seeds of the different kinds of silkworms being usually kept up here, all the nurseries look to it for supply of the proper kind of seed at each change of season. This nursery has also hitherto been regarded as the medium of exchange of seed—a condition which is highly essential for the health of the silkworm. In other words, seed-cocoons received from different nurseries are seeded here, and the eggs thus obtained from different climes are reared under proper surroundings. This has the tendency of adding to the vigour of the stocks. From the 16th August to the 5th of November, when I was on leave, the Chaltia Nursery was practically left without supervision. This resulted not only in the entire deterioration of the stocks in this nursery, but it affected prejudicially the working of nearly all the nurseries in the other districts also. The demand of the experimental nurseries for *chotapalu* seed for the November *bund* was not met, nor were any arrangements made for the supply of *nistari* seed to the experimental nurseries in November in preparation for the March *bund*. Seed-rearing for the two most important *bunds* of the year was thus more or less hampered in almost every nursery, and in some cases, *e.g.*, in Mehedipur and Garhbeta nurseries, the work remained suspended since August to the end of the year.

The stocks of silkworms at the Chaltia Nursery have been completely renovated, and now this nursery has stocks of *nistari*, *chhotapalu*, *barapalu* and the *endi* silkworm, all practically free from disease.

The results obtained in this nursery during the year are detailed in the following table :—

Chaltia (Berhampore).

Serial No.	Name of bunds.	Kind of cocoons reared.	Whence seed obtained.	Quantity of seed used.	Date of hatching.	Date of ripening.	Outturn of cocoons.	Quantity sold for seed.	Price realized by sale of seed.	Quantity of cocoons sold for reeling.	Price of ditto.	Total sale produce.	Percentage per reline.	Number of cut shells in one tola.	Villages in which seed was used.	Remarks.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
				Kh.			Kns.	Kns.	Rs. A. P.			Rs. A. P.				
1	April	Nistari	From previous crop and samples from different nurseries.	1/10	2nd April ...	24th April ...	5½	5½	16 0 0	Nil ...	.....	16 0 0	Nil ...	120	Lahore and Pakuria ...	Result not known.
2	May	Chhotapalu ...	Ditto ...	1/8	23rd ,, ...	14th May ...	7½	7½	16 8 0	Nil ...	.....	16 8 0	Nil ...	154	Batnagar, Duna, Rajshahi, Chaltia.	Result good.
3	June	Nistari	Ditto ...	1/8	1st June ...	22nd June ...	5½	5½	7 8 0	Nil ...	.....	7 8 0	Nil ...	96	Garbetia Upershool ...	Ditto.
4	July	Chhotapalu ...	Ditto ...	1/8	30th ,, ...	22nd July ...	20	20	11 4 0	Nil ...	.....	11 4 0	2% ...	104	Belia, Dengapara, Banur, Chaltia.	Ditto.
5	,, ...	Nistari	Ditto ...	1/8	1st July ...	22nd ,, ...	40	40	34 12 0	Nil ...	.....	34 12 0	Nil ...	80	Malda, nursery Midnapore, Derhadun, Chaltia, Bhakri.	Ditto.
6	August	Chhotapalu ...	Ditto ...	¼	7th August ...	27th August ...	12½	11½	23 0 0	1 kh.	0 8 0	23 8 0	...	144	Chaltia, Bhakri, Dangapura, Belia, Raipur, Banur, Uppershool, Garbetta.	Ditto,
7	October	,, ...	Ditto ...	1/10	21st September ...	10th October ...	4½	4½	6 0 0	...	.....	6 0 0	...	120	Garbetta, Uppershool, Bakhiria, Belia, Dangapara.	Ditto.
8	,, ...	,, ...	Ditto ...	1/8	5th October ...	27th ,, ...	2½	2	2 0 0	...	.....	2 0 0	3%	112	Belia.	
9	November ...	Nistari	Ditto ...	2/5	29th ,, ...	28th November ...	2	2	2 0 0	...	.....	2 0 0	65%	112	Kandopara	Crops failed.
10	,, ...	Chhotapalu ...	Ditto ...	1/10	28th ,, ...	3rd December ...	10½	4½	4 8 0	5½	3 0 0	7 8 0	100%	128	Dangapara	Ditto.
11	January	Nistari	Kagachira Nursery	¼	4th January ...	16th February ...	12½	5½	2 12 0	7	.....	2 12 0	5%	120	Panchkamini	Result good.
12	,, ...	Chhotapalu ...	Jot Nursery ...	1/10	10th ,, ...	24th ,, ...	8½	8½	12 4 0	Nil ...	.....	12 4 0	2%	108	Sajanpur, Midnapore, Jat, Araidanga, Birampur.	Ditto.
13	March	Barapalu	Duna Nursery ...	1/20	26th ,, ...	28th ,, ...	3	Seed	(Reserved for next year)			.....	2%	90	Ameherpur, Noadapara, Pokhuria and Chhogaria.	
	Total of 1896-97 ...	.....	.....	1 1/10	.....	.....	134½	117-5	138 8 0	13¾	3 8 0	142 0 0	16%	116		

The Assistant Overseer in charge of the Chaltia Nursery was removed for his incompetence. He was besides an illiterate man. So long as I was immediately in charge of this nursery, and so long as the Travelling Overseer's head-quarters were at Berhampore, the retention of a man of this class in charge of the nursery answered very well; but when he was left more to his own resources, he proved utterly incompetent. The Travelling Overseer was put in charge of the Chaltia Nursery after this. Three alternative proposals were made to carry on the work of the Chaltia Nursery efficiently: (1) That the Travelling Overseer should be employed in organising new nurseries, and that he should go to Pananagar in the district of Rajshahi, and that the Rajshahi assistant, who was the next best man, should remain in charge of the Chaltia Nursery. (2) That the Chaltia Nursery be made over to Babu Lalit Mohan Banerji, who was willing to carry on the nursery independently, giving up Government service, if he were granted 3 acres of mulberry land and 3 acres of agricultural land on ordinary khas mahal rent (the Chaltia Nursery being situated on Government khas mahal land, and if an additional rearing room were added to the existing nursery. To carry out this scheme would have cost some Rs. 600 or Rs. 700, or about the same as it now costs to keep up the Chaltia Nursery annually. (3) That the Travelling Overseer should continue to remain in charge of the Chaltia Nursery, occasionally visiting other nurseries when work in the Chaltia Nursery is slack. These proposals, however, were not approved, and a new man must now be appointed to the charge of this nursery.

C.—The Balia and Kandapara Nurseries.

This was a new nursery established during the year in the Kandi subdivision of Murshidabad. A number of cocoon-rearers from the Kandi subdivision have been taking seed from me for some years past, and latterly some of them put themselves under training. Of these, two were considered sufficiently trained to be allowed a loan of special appliances. These two, Raghunath and Shashi Bhusan, live in two contiguous villages, and one microscope and one spraying machine are in use between them. Raghunath has just finished building a house according to the experimental plan, and his first crop of cocoons has not been taken yet. Before the 31st March, however, he reared one crop of cocoons in his old house successfully, selecting the seed and disinfecting his appliances. This crop of 30 kahans was fit for seed (showing only 2 per cent. of pebrine), but it did not have any sale for this purpose, as it was excessively dry at the time, and there was no demand for seed any where. Shashi Bhusan of Kandapara has not built a house on the proper plan yet, but he has taken to rearing from microscopically-selected seed and with disinfected appliances. His first experimental crop falls within this year, and it is, therefore, not included in this report.

Berhampore;
The 30th May 1897.

N. G. MUKHERJI,
Depnty Cellector.

APPENDIX II.

List of products of which specimens were collected for the Indian Museum, Calcutta, and for the Imperial Institute, London, during the year ending 31st March 1897.

Botanical name of product.	Vernacular name of product.	Parts collected.
1	2	3
Ægle marmelos ...	Bel	Gum, root, bark, rind, and fruits.
Apium graveolens ...	Randhuni	Seeds.
Arto carpus integrifolia ...	Kanthal	Do.
Canscora decussata ...	.....	Plant.
Cassia alata ...	Dadmardan	Roots, bark, and leaves.
Celsia coromandeliana ...	Kokesima	Roots.
Cephalandra indica ...	Telakuch	Leaves, fibre.
Citrullus vulgaris ...	Tarmuj	Seeds.
Clitoria ternatea ...	Aparajita	Do.
Cardios spermum halicacabum	Lataphatkari	Roots.
Cassia occidentalis ...	Kalkashanda	Roots, leaves.
Cleome viscosa ...	Hurhuria	Leaves.
Cyperus rotundus ...	Mutha	Roots.
Carissa carandas ...	Karanja	Fruit.
Dæmia extensas ...	Chagulbauti	Leaves, juice.
Datura fastuosa ...	Kaladhutura	Seeds.
Dillenia indica ...	Chalta	Bark, leaves.
Dregea volubilis ...	Titkunga	Fibre.
Eragrostis cynosuroides ...	Kusha	Grass.
Erythræa roxburghii ...	Gima	Plant.
Erythrina indica ...	Palitamadar	Leaves, fibre.
Eugenia jambolana ...	Kalajam	Seeds.
Euphorbia thymifolia ...	Dudiya	Leaves.
Ficus roxburghii ...	Doomoor	Fibre, fruits.
Ficus glomerata ...	Jajnadoomoor	Leaves, roots, fruits.
Ficus religiosa ...	Asvatha	Fruits.
Ficus bengalensis ...	Bat	Seeds.
Feronia elephantum ...	Kathbel	Unripe fruits.
Glycosmis pentaphylla ...	Ashshawra	Roots, twigs.
Heliotropium indicum ...	Hatisura	Plant.
Hibiocusrosa sinensis ...	Joba	Leaves, fibre, flowers.
Herpestis monniera ...	Brimhisak	Plant.
Hibiscus esculentus ...	Dhenras ...	Fruits.
Jasminum sambac ...	Bel, banamallika ...	Leaves, flowers.
Kalonchoe laciniata ...	Himsagar	Leaves.
Lawsonia alba ...	Mendi	Flowers.
Luffa acutangula ...	Jhinga	Fruits, leaves, and roots.
Leea crispa ...	Banchalita	Leaves and roots.
Mentha sylvestris ...	Podina	Leaves.
Michelia champaca ...	Champa	Roots, leaves, bark.
Melia azadirachta ...	Nim	Leaves, twigs.
Melia azadarach ...	Mahanim	Leaves, bark, fruits.
Momordica charantia ...	Karala	Fruits.
Mirabilis jalapa ...	Krishnokeli	Leaves.
Morus indica ...	Tunt	Bark.
Musa sapientum ...	Kala	Ashes, leaves, bark, fruits, flower heads.
Mimusops elengi ...	Bakul	Flowers.
Mangifera indica ...	Am	Fruits, bark, leaves.
Momordica cochinchinensis ...	Kakrole	Fruits.

C A. P. & C. E. G.—Reg. Nos. 1882J, 1687J & 2005C—700—7-8-97.

REVENUE DEPARTMENT.

AGRICULTURE.

DARJEELING, THE 8TH OCTOBER 1897.

RESOLUTION NO. 842T.—R.

READ—

(1) Letter No. 878A., dated the 14th August 1897, from the Board of Revenue, Lower Provinces, Land Revenue Department, submitting the Report of the Department of Land Records and Agriculture for the year 1896-97.
(2) The Report itself.
(3) Read also the Resolution of Government on the Report for the year 1895-96.

THE Officiating Lieutenant-Governor is glad to notice that the Annual Report of the Department of Land Records and Agriculture, Bengal, for the year 1896-97 reached Government with the Board's remarks a day before the due date, *i.e.*, the 15th August 1897. The report is for the first time submitted in the form prescribed by the Government of India in the Eighth Resolution of the Revenue and Agricultural Department, dated the 20th March 1897, on the proceedings of the Agricultural Conferences of 1893 and 1895-96, and includes also for the first time a report on the subject of Land Records establishment. Mr. P. C. Lyon was in charge of the Department from the 18th February to the 22nd November 1896, when Mr. Macpherson resumed charge on his return from furlough. The report is submitted by Mr. Allen, who was in temporary charge from the 23rd June 1897.

2. *Chapter II of the Report: Land Record Establishment.*—Three offices for the registration of mutations under the Land Records Maintenance Act III (B.C.) of 1895 were opened during the year in the area recently cadastrally surveyed in North Bihar, at Hajipur and Mahnar, in Muzaffarpur, and Bettiah in Champaran. The following table shows the amount of work done during the year in the two offices in the district of Muzaffarpur:—

Number of applications received for registration of mutations—			Number of refusals.	Number pending.	Number disposed of.		
From the parties direct under section 6.	From the Sub-Registrar of Assurances under Rule 5.	Total.			Succession.	Transfer.	Total.
1	2	3	4	5	6	7	8
3,518	719	4,237	234	1,565	226	2,212	2,438

The District Registrar of Champaran was unable to submit his report on the working of the Bettiah office during the year for incorporation in the

Director's report, but the following figures supplied by the Settlement Officer of North Bihar show the number of mutations registered in that office: —

Succession.	Transfers—			Total number of mutations registered.
	On application made by the parties direct under section 6.	On applications received from the Sub-Registrar of Assurances under Rule 5.	Total.	
1	2	3	4	5
68	701	524	1,225	1,293

3. The smallness of the number of mutations by succession as compared with the number of mutations in consequence of transfers by sale, and the paucity of the total number of mutations recorded as compared with the total number of tenancies, show that registration of changes under the Act is far from perfect. This is what was anticipated; but still, as the Board of Revenue remark, the Act has worked as satisfactorily as could have been expected, and, in spite of local distress, the number of applications for registration has been large, and the people have shown eagerness to have the transfer of rights duly recorded.

Mr. Hare, late Collector of Muzaffarpur, makes the following remarks on the working of the Act:—

"The Land Records Maintenance Act worked in this subdivision (Hajipur) as satisfactorily as could be expected. Though the Act was actually brought into force some four months after the commencement of the year under report, with an insufficient supply of the registers of mutations, and notwithstanding the prevalence of famine, there was a remarkably large presentation of notices by the parties. The people certainly appear to be eager to have the transfers of their rights acquired duly recorded in the Government papers in the same way as their deeds are registered. The Act, therefore, cannot but be popular among all classes, as it opens to them ways to make *pucka* their rights acquired from time to time."

The Lieutenant-Governor desires that the Director should endeavour in his future reports to analyse the figures of registration of mutations more minutely than has been done in the present report, by giving percentages of mutations actually registered on the number of holdings, and the number which might reasonably have been expected to be registered on account of successions, transfers by sale or gift, &c., so as to give a clearer idea of the working of the system. A further improvement may also be effected by specifying the nature of the transfers made, *i.e.*, whether they were of entire holdings or only of parts of holdings, the price paid per acre in cases of transfer by sale, the number of mistakes detected in the original records, and so forth. It is reported that mutation work was hampered by certain defects in the rules framed under the law, as well as in the form of the mutation register prescribed by Government. The Lieutenant-Governor desires that a special report may be submitted to Government by the Director after communication with the Inspector-General of Registration through the Board, pointing out any practical difficulties experienced in the working of the Act, and submitting definite proposals for their removal. The number of registrations of mutations effected is, as already remarked, larger than the Lieutenant-Governor had anticipated, and it has now become a matter worthy of careful consideration whether, by the introduction of some modifications in the rules and by the attachment of amins (to be paid from the surplus proceeds of fees) to the Registration offices, a really efficient method of keeping the records corrected up to date cannot be devised under the Act as it stands and without any further legislation. Besides the areas described in paragraph 2, the Land Records Maintenance Act has been introduced only into the Sujamutha pargana, in the district of Midnapore, to which it was extended with effect from 1st January 1897, and the writing of the mutation register had not been commenced before the close of the year.

4. The report gives a full and interesting account of the arrangements made for the maintenance or revision of settlement records in the Khurda, Angul and Banki Government estates, the Kujang and Kanika Wards' Estates, all in Orissa, and in the Backergunge and Western Duars Government Estates and the Burdwan Raj, Dakhin Shahbazpur and Maldwar Wards' Estates; but the subject might be more completely illustrated by an analysis of the figures in future reports in the manner indicated in the preceding paragraph. The figures of mutations recorded in the Burdwan, Maldwar and Dakhin Shahbazpur Wards' estates show that arrangements for maintenance of records exist in these estates only on paper, and that the great majority of mutations are not recorded at all. The Director should call the attention of the Collectors and Managers concerned to this matter, and should insist on the rules and orders for the maintenance of records in these and other estates being carried out in practice. In the Burdwan estates only 13 mutations were recorded in 14,527 tenancies during the year, or less than 1 in 1,000 (which is an absurd figure), while in the Kanika estates 1,520 mutations were recorded in 30,980 tenancies.

5. *Maintenance of boundary marks.*—The information which has now been furnished for the first time on the subject of the maintenance of boundary marks is useful, though necessarily incomplete. As the Board point out the subject should be more fully dealt with by District Officers and Commissioners in their Annual Land Revenue Administration Reports. The subject of legislation to provide for the maintenance of permanent survey marks is under the consideration of Government in connection with the amendment of the Bengal Tenancy Act.

6. *Chapter IV of the Report: Scientific and National Enquiry under Imperial Control.*—A monograph on the races of wheat grown in Bengal by Surgeon-Major D. Prain was published during the year as a bulletin of the Agricultural Department, and similar monographs on the races of rape and mustard have since been received. Dr. Prain has also prepared a note on rusts in wheat which has been published by the Botanical Survey Department. The enquiries which had been instituted into the causes of betelnut plague in the districts of Backergunge and Noakhali during the year 1895-96 were continued during the year under report by Dr. G. Watt, Economic Reporter to the Government of India, who visited the affected areas with Mr. N. G. Mukherji; they reported that the disease had subsided. But it is possible that there may be a recrudescence of the disease, and the Collectors of betelnut-growing districts were supplied with copies of Mr. Mukherji's report, which embodied the result of the tour, and were directed to give a wide circulation to Dr. Watt's recommendations. The disease is still under investigation by Dr. Watt and Brigade-Surgeon-Lieutenant-Colonel D. D. Cunningham. The Lieutenant-Governor notices with approval that the Department of Agriculture is working in the matter of scientific enquiry in concert with such experts, in their several lines, as Surgeon-Major Prain, Dr. G. Watt and Brigade-Surgeon-Lieutenant-Colonel D. D. Cunningham, and His Honour hopes that valuable results may in time ensue from their united labours.

7. *Dr. Leather's tour in Bengal and his analyses of soils, water, &c.*—During the year under report Dr. J. W. Leather, PH.D., Agricultural Chemist to the Government of India, visited the Dumraon and Burdwan farms, and made a number of analyses and experiments with sugarcane and analysed several samples of manures sent to him from those farms. He also analysed samples of soils and well-water from certain tracts in North Bihar, which were sent to him, when it was found that the rains had failed to give sufficient moisture for the cultivation of the *rabi* crops in the usual manner; the raiyats and some indigo planters objected to the use in certain soils of well-water for the purpose of irrigation, as containing large quantities of sodium salts, but Dr. Leather pronounced that it might with perfect safety be so used. It may be well to test the correctness of this opinion, if possible, by experiment. Dr. Leather also wrote notes on the methods of jute-steeping and extraction of the fibre after visiting during the rainy season of 1895-96 some of the jute-producing districts in Northern and Eastern Bengal. These notes have since been published, but no change in the existing methods of separating the fibre has been suggested. Extended enquiries were made by Dr. Watt with regard to the cultivation of *rhea* fibre in Bengal.

8. *Working of the Bengal Civil Veterinary Department.*—In a separate Resolution, No. 2252Agri., dated the 27th July 1897, the Lieutenant-Governor has reviewed the Annual Progress Report of the Civil Veterinary Department in Bengal for the year 1896-97, and it is unnecessary therefore to refer again to that subject here.

9. *Chapter V of the Report: Scientific and Local Enquiry under Provincial Direction.*—It had been intended that an analysis of the district of Shahabad similar to those already prepared for Burdwan, Dacca, Cuttack and Lohardaga should be prepared during the cold weather of 1896-97; but owing to the pressure of work connected with the famine, the Director and his two assistants were unable to direct their attention to this important subject. The statistics and notes on the outturn and areas of crops furnished by the Department were found most useful by Government and local officers in gauging the areas affected by distress and the intensity of it, and helped them materially to form, at the early stages of the famine, estimates and forecasts which events have since proved to have been almost absolutely correct.

10. *Experimental farms and manure and crop experiments.*—As in the previous years, agricultural experiments were carried on during the year under report at the Sibpur, Burdwan and Dumraon farms under the supervision of the Department of Agriculture, as well as in Government, Wards' and private estates. Experiments were made at the Sibpur farm to determine the comparative values of crude saltpetre and castor-cake as manures for cabbages. The result showed the decided superiority of the former. Experiments were also made in the Burdwan and Dumraon farms, which proved that cowdung was the best manure for the cultivation of jute and wheat. The cultivation of Naini Tal potatoes was attempted during the year with varying success in various places throughout the province. Experiments made in the Burdwan farm to test the comparative merits of trench-planting and the ordinary method of sowing sugarcane showed that the former gave the best results; and that method now finds favour with the raiyats of Burdwan. During the year considerable quantities of Naini Tal potatoes for seed and of castor-cake for manure were sold to the raiyats of the neighbourhood of the Burdwan farm with satisfactory results. A large number (167,200) of cuttings of imported varieties of sugarcane was also sold to the raiyats of the neighbourhood of the Dumraon farm. The Lieutenant-Governor is pleased to notice the growth among native landholders of a tendency to co-operate with the officers of the Department in the introduction of improved methods of agricultural operations and in trying new staples. At the initiative of the Department, potato cultivation was introduced some years back in the Jalpaiguri Duars, and it is now reported by the Commissioner that this "crop is finding much favour with the raiyats and both the soil and climate are admirably adapted to its cultivation." Sir Alexander Mackenzie in a Resolution, dated the 9th October 1896, directed that special attention should be given to the introduction of agricultural improvements in Government and Wards' Estates; the present report shows that some effort has been made in the direction indicated, but Mr. Stevens trusts that future years will see increased exertions in this matter with results beneficial to the agricultural community at large.

11. *Enquiries into the causes of agricultural deterioration.*—In May 1896 Mr. N. G. Mukherji was deputed by the Director of the Agricultural Department to inspect the cultivation of long-stemmed paddy in a tract of low-lying country in the Contai subdivision of the district of Midnapore, known as the Argoal Circuit, which has been for a series of years suffering persistent agricultural deterioration in consequence of defective drainage. Mr. Mukherji's prediction that the experiment would not be attended with success was borne out by the result. The reclamation of the tract in question is now under the consideration of this Government in the Public Works Department. Useful enquiries were also made during the year by Mr. B. C. Basu, one of the Director's Assistants, into the causes of distress in the districts of Nadia, Jessore and Khulna, and his report on the last-named district showed that the affected area has suffered from incursions of salt water in years of short rainfall, a danger against which the existing system of embankments does not afford a sufficient protection.

12. *Silk experiments.*—Mr. N. G. Mukherji having returned to the regular line of Government service from the special duty in connection with the conduct

of silk experiments in Bengal, on which he had been for some years employed, a new scheme was laid down by this Government in October 1896 for the continuance of those experiments until properly managed nurseries shall have been established in every silk centre in this province. According to this scheme, the District Officers are placed in immediate charge of the nurseries in their districts, subject to the superintendence of the Director. The professional control of the nurseries will be carried on by Mr. Mukherji in Murshidabad (to which district he was posted during the year as a Deputy Collector) and elsewhere by the Director's Assistants. It was arranged that three new nurseries should be opened every year, managed by the Department for a year (with an overseer or assistant overseer in charge), and then handed over to a cocoon-rearer trained during the year.

13. Ten seed-rearing nurseries were under the cognizance of the Agricultural Department at the close of the year under report, against nine in the previous year. The total quantity of cocoons raised during the year was 7,329 *kahans*, against 6,451½ *kahans* during the previous year, whilst the quantity sold to cultivators was 1,056 *kahans*, or 3,200 ounces, against 1,331 *kahans* or 4,000 ounces during 1895-96. Mr. Mukherji attributes this falling off in the sale to the failure of the Central Nursery at Chaltia in Murshidabad to supply seed to the out-stations, and to the excessively dry character of the last cold weather, which checked the growth of mulberry, and thus put a stop to cocoon-rearing in many places.

14. *Chapter VI. Agricultural Education.*—The Agricultural Conference held in Calcutta in 1896 recommended (1) that the course of study in primary and middle schools should be so revised as to include a graduated series of lessons in agriculture and in other subjects of Elementary Science, (2) that agricultural classes should be opened in connection with the Sibpur Engineering College and, (3) that a certain number of appointments in the Public Service should be reserved for those who have received an agricultural education. Sir Alexander Mackenzie accepted these recommendations. The sanction of the Government of India has recently been received to the opening of the agricultural classes at Sibpur, and the details of the scheme which will soon be published for giving effect to all these recommendations of the Conference are now being worked out.

15. *Chapter VII of the Report: Publication of Agricultural information.*—The Agricultural Department prepared and published during the year the general forecasts of *rabi*, *bhadoi*, winter rice, wheat, jute and oilseed crops; also reports on cotton and indigo crops, tables of agricultural statistics for 1895-96, and a list of agricultural implements tested or in use, besides two Bulletins and a Monograph on "Dyes and Dyeing" by Mr. N. N. Banerjee, Assistant Director.

16. *Chapter VIII of the Report: Emigration to Burma.*—The arrangements made some years ago by this Government with the British India Steam Navigation Company for the conveyance by their steamers from Calcutta to Rangoon of "State emigrants" from the congested tracts in Bihar, Chota Nagpur and Orissa, continued in force during the year under report, the number of emigrants conveyed being 241, against 136 in 1895-96 and 304 in 1894-95. This Government has recently requested the Government of Burma to furnish it with any information that may be available, to throw light on the causes which check the flow of emigration.

17. *Agricultural Exhibitions.*—Agricultural exhibitions were held during the year at Barhampur in Shahabad, Sonepur in Saran, Kalimpong in Darjeeling, Alipur and Falakata in Jalpaiguri, Rukindipur in Bogra, Cossipur near Calcutta, Hat-Chapra in Nadia, and Suri in Birbhum. All these, with the exception of the exhibition at Cossipur, were assisted by Government with grants of money, which were chiefly spent in prizes.

18. *Cost of Agricultural Experiments.*—The total expenditure of the Department on agricultural enquiry and improvement (excluding the pay of the superior establishment and the expenditure on silk experiments and the cost of the Civil Veterinary Department) was Rs. 10,354, against Rs. 9,287 in the preceding year. The expenditure is small and, in the Lieutenant-Governor's opinion, is more than justified by the information collected and practical results achieved.

19. The thanks of the Lieutenant-Governor are tendered to Mr. Macpherson and Mr. Lyon for the zeal and care with which they supervised the work of the multifarious branches of the Department, and to Mr. Allen for his interesting report. Mr. Stevens cordially agrees with the Director in the commendation bestowed on his Assistants, Mr. Bhupal Chandra Basu and Mr. Nagendra Nath Banerjee.

ORDER.—Ordered that the Resolution be published in the *Calcutta Gazette*, and that a copy of it together with the Report and the forwarding letter of the Board of Revenue, be submitted to the Government of India, in the Revenue and Agricultural Department, and a copy forwarded also to the Board of Revenue.

By order of the Lieutenant-Governor of Bengal,

M. FINUCANE,

Secretary to the Govt. of Bengal.

No. 3061Agri.

COPY forwarded to the Secretary to the Board of Revenue, Land Revenue Department, for the information of the Board.

No. 3062Agri.

COPY forwarded to the Director of the Department of Land Records and Agriculture, Bengal, for information.

Nos. 3063-64Agri.

COPY, with a copy of the report, forwarded to the $\frac{\text{Appointment}}{\text{Political}}$ Department of this office for $\frac{\text{information}}{\text{information and communication to the Inspector-General of Registration}}$.

By order of the Lieutenant-Governor of Bengal,

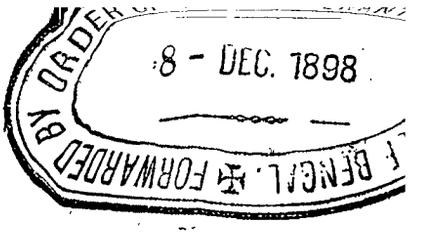
E. M. KONSTAM,

Under-Secy. to the Government of Bengal.

CALCUTTA,
The 15th October 1897.

Reg. No. 4892C—804—18-10-97.

REPORT



OF THE

DEPARTMENT OF LAND RECORDS AND AGRICULTURE,

BENGAL,

For the year ending 31st March 1898.

Calcutta:
BENGAL SECRETARIAT PRESS.
1898.

TABLE OF CONTENTS.

		Page
CHAPTER	I.—Prefatory	1
CHAPTER	II.—Land Records establishment, and maintenance of boundary marks	2—11
CHAPTER	III.—Utilization of land records	12
CHAPTER	IV.—Scientific and national enquiry under Imperial control:—Botanical examination of the varieties of rape, and mustard, and of various leguminous crops; *Æschynomene Indica;* betel-leaf (*Piper* betel, *pan*); betelnut plague in East Bengal; chemical analyses of soils, sugar, &c., by Dr. Leather; saline efflorescence or *reh* in North Bihar; cultivation of *rhea* in Bengal; collection of articles for the Indian Museum and Imperial Institute, London; Bengal Veterinary Department, Cattle-breeding	12—13
CHAPTER	V.—Scientific and local enquiry under Provincial direction:—Analyses of districts; experimental farms; agricultural experiments and the introduction of new and improved staples in Government, wards', and private estates; experiments made by the Agricultural and Horticultural Society of India; trial of improved agricultural implements in Wards', Government, and private estates; supply of seeds, manures, and implements; crop-cutting experiments by District Officers and Settlement Officers; crop-cuttings in jail gardens; locusts and other insect pests; sericulture; arboriculture	13—30
CHAPTER	VI.—Agricultural education	30
CHAPTER	VII.—Publication of agricultural information	30—31
CHAPTER	VIII.—Final:—Emigration to Burma; Agricultural exhibitions; applications for patents for inventions; cost of miscellaneous experiments and enquiries; officers of the Department	31—34

APPENDICES.

	Page.
I.—List of products of which specimens were collected for the Indian Museum, Calcutta, and for the Imperial Institute, London, during the year ending 31st March 1898	i
II.—List of seeds, implements, manures, &c., distributed by the Department during the year 1897-98	ii

INDEX.

	Chapter.	Page.	Para.
A.			
Æschynomene Indica (*Sola*)	IV	12	33
Agricultural education	VI	30	75—76
Agricultural exhibitions (See under Exhibition)	VIII	31—33	79—88
Agricultural experiments and introduction of new and improved staples in Government and wards' estates	V	20—24	47—56
——— in Bhagalpur Division	V	23	54
——— in Burdwan „	V	20	48
——— in Chittagong „	V	21—22	52
——— in Chota Nagpur „	V	23—24	56
——— in Dacca „	V	21	51
——— in Orissa „	V	23	55
——— in Patna „	V	22—23	53
——— in Presidency „	V	20—21	49
——— in Rajshahi „	V	21	50
Agri-Horticultural Society of India—Experiments made by	V	24—26	57
Analyses of districts	V	13—14	42
Analyses—Chemical—of soil, sugar, etc. by Dr. Leather	IV	12—13	36
Arboriculture	V	30	74
B.			
Betel leaf (*Piper betel*)	IV	12	34
Betel-nut plague in East Bengal	IV	12	35
Botanical examination of the varieties of rape and mustard and of various leguminous crops	IV	12	32
Boundary marks—Maintenance of	II	9—11	21—30
——— in Bhagalpur Division	II	11	30
——— in Burdwan „	II	9	22
——— in Chittagong „	II	10	26
——— in Chota Nagpur „	II	11	29
——— in Dacca „	II	10	25
——— in Orissa „	II	11	28
——— in Patna „	II	10—11	27
——— in Presidency „	II	9	23
——— in Rajshahi „	II	9—10	24
Burdwan Farm	V	15—17	45
Burma—Emigration to	VIII	31	78
C.			
Cattle-breeding—Bengal Veterinary Department	IV	13	41
Collection of articles for the Indian Museum and Imperial Institute, London	IV	13	39—40
Crop-cutting experiments by District Officers and Settlement Officers	V	27	60
Crop-cuttings in jail gardens	V	27	61
D.			
Date-palm	V	30	74
Divi-divi	V	30	74
Dumraon Farm	V	17—19	46
E.			
Education—agricultural	VI	30	75—76
Emigration to Burma	VIII	31	78
Enquiry—scientific and national—under Imperial control	IV	12—13	32—41
——— under Provincial direction	V	13—30	42—74
Eucalyptus	V	30	74
Exhibitions—agricultural	VIII	31—33	79—88
Exhibition—Alipur and Falakata Fairs	VIII	32	83
——— Barhampur Agricultural Show	VIII	32	86
——— Bera Horse and Cattle Fair	VIII	32	84

	Chapter.	Page.	Para.
Exhibition—Kalimpong Fair	VIII	32	82
——————Madhupur Exhibition	VIII	31—32	81
——————Sitamarhi Cattle Fair	VIII	33	88
——————Sonepur Fair	VIII	32	86
——————Suri Cattle Fair	VIII	31	80
——————Titanga Agricultural Show	VIII	33	87
Experimental farms (See under Farms)	V	14—19	43—46
Experiments and enquiries—Cost of miscellaneous	VIII	33	90
Experiments made by the Agri-Horticultural Society of India	V	24—26	57
F.			
Farms	V	14—19	43—46
Farm—Burdwan	V	15—17	45
———Dumraon	V	17—19	46
———Experimental	V	14	43
———Sibpur	V	14—15	44
I.			
Implements—Trial of improved agricultural—in wards', Government, and private estates	V	26	58
Inventions—Applications for patents for	VIII	33	89
Insect-pests, other than locusts	V	28—29	71
L.			
Land records establishment	II	2—9	4—20
—————— Utilization of	III	12	31
Locusts and other insect-pests	V	27—28	62—70
——— in Bhagalpur Division	V	28	68
——— in Burdwan ,,	V	27	63
——— in Chittagong ,,	V	27	67
——— in Chota Nagpur ,,	V	28	70
——— in Dacca ,,	V	27	66
——— in Patna ,,	V	28	69
——— in Presidency ,,	V	27	64
——— in Rajshahi ,,	V	27	65
M.			
Mutations—Registration of	II	2—9	4—20
——————— in Angul Government estate	II	4	11
——————— in Backergunge ,,	II	5—6	14
——————— in Banki ,,	II	4	12
——————— in Bihar (North)	II	2—4	5—10
——————— in Burdwan Raj Khas Mahals	II	6	15
——————— in Dakhin Shahbazpur ward's estate	II	8	19
——————— in Kanika estate	II	7	17
——————— in Kujong ,,	II	6—7	16
——————— in Maldwar ,,	II	8—9	20
——————— in Sujamutha ward's estate	II	7—8	18
——————— in Western Duars (Government Estates)	II	4—5	13
O.			
Officers of the Department	VIII	34	91
P.			
Prefatory remarks	I	1	3
Publication of agricultural information	VII	30—31	77
R.			
Reh or saline efflorescence in North Bihar	IV	13	37
Rhea—Cultivation of—in Bengal	IV	13	38
S.			
Saline efflorescence or reh in North Bihar	IV	13	37
Sericulture	V	29—30	72—73
Sibpur Farm	V	14—15	44
Sola (*Æschynomene Indica*)	IV	12	33
Supply of seeds, manures, and implements	V	26	59
V.			
Veterinary School—Bengal	VI	30	76

DEPARTMENT OF LAND RECORDS AND AGRICULTURE, BENGAL.

No. 1928A.

FROM P. C. LYON, ESQ.,

Director of the Department of Land Records and Agriculture, Bengal,

TO THE SECRETARY TO THE BOARD OF REVENUE, L. P.

Dated Calcutta, the 30th August 1898.

SIR,

I HAVE the honour to submit the report of the Department of Land Records and Agriculture for the year ending 31st March 1898, and to express my regret for the delay that has occurred in preparing it. It is due to the difficulties I have experienced in getting the compilation promptly carried through during my constant absence on tour. This is the thirteenth Annual Report that has been submitted by this Department on the subject of the work done under the heads of agricultural enquiry, agricultural experiments, and agricultural improvements.

2. The report has been drawn up in accordance with the instructions laid down in the eighth Resolution of the Government of India, Revenue and Agricultural Department, No. $\frac{3}{39\text{-}1}$, dated the 20th March 1897, on the proceedings of the Agricultural Conferences of 1893 and of 1895-96, and has been divided as follows:—

Chapter I.—Prefatory.
Chapter II.—Land records establishment.
Chapter III.—Utilization of land records.
Chapter IV.—Scientific and national enquiry under Imperial control.
Chapter V.—Scientific and local enquiry under Provincial direction.
Chapter VI.—Agricultural education.
Chapter VII.—Publication of agricultural information.
Chapter VIII.—Final.

CHAPTER I.

PREFATORY.

3. Mr. W. C. Macpherson was in charge of the Department of Land Records and Agriculture, Bengal, from the beginning of the year up to the 23rd of June, when he was deputed on special duty in connection with the Orissa Settlement operations, and again from September the 5th up to the 22nd of November 1897, when I took over charge of the Department on his reversion to general duty as Collector of Saran. During Mr. Macpherson's term of special duty in 1897, Mr. C. G. H. Allen, I.C.S., Settlement Officer of Chittagong, officiated as Director. A full account of the tours of the Director is given each year in the Annual Report for the Survey and Settlement year, which ends on September 30th.

The appointments of Assistant Director, two in number, were held by Mr. Bhupal Chandra Basu and Mr. Nagendra Nath Banerjei at the commencement of the year. On September 14th, Mr. Bhupal Chandra Basu gave over charge of his appointment to Mr. Nitya Gopal Mukherji, on transfer to Assam as Assistant Director of Land Records and Agriculture in that Province. On the 2nd of March, Mr. Nitya Gopal Mukherji was appointed to be Lecturer on Agriculture at the Sibpur Engineering College, and he was succeeded on the 16th of the same month by Mr. Dejen Lala Roy.

CHAPTER II.

LAND RECORDS ESTABLISHMENT.

4. In Resolution No. 812T.R., dated 8th October 1897, on the Report of the operations of this Department in the year 1896-97, His Honour the Lieutenant-Governor called for a special report from the Director of Land Records and Agriculture on the working of the Land Records Maintenance Act, III (B.C.) of 1895. This report has been recently submitted to the Board with my letter No. 1294S., dated 5th July 1898, and in it the figures of mutations registered under the Act in the three offices in North Bihar, the only ones as yet open, have been analysed at some length. The question of the value of the Act and the work done under it as a means for securing the maintenance of the record up to date has also been dealt with, and the possibility of improving its working and of removing certain defects in the Act itself, and in the rules under it, has been discussed. The Inspector-General of Registration has also, with his letter No. 4565, dated 28th July 1898, submitted a special report on the working of the Act during the past year. In these circumstances I do not propose to enter at length upon the figures showing the working of these offices during the current year.

5. After a careful examination of the statistics of mutations recorded by the Registrars of Mutations at Bettiah, Hajipur, and Mahnar, I came to the conclusion in my special report that the Act had failed in its attempt to compel the tenants referred to in it to register transfers of their holdings before the Registrars of Mutations, and that the chief reasons of the failure were the weakness of the provisions of the Act which were designed to enforce registration, and the absence of any incentive to induce the tenants to register. As regards the Act itself, I noted the following reasons for thinking that it must fail by itself to maintain the record of rights:—

"(*a*) It assumes that the registration of proprietary rights in the Collectorate registers, which is notoriously incomplete and takes no note of the facts on the ground, or of actual possession, is sufficient to maintain the record of rights as far as it concerns proprietary interests.

(*b*) It ignores the necessity for the correction of the map and the khasra in the village.

(*c*) It provides no means of ascertaining by local inspection how far transfers are really being registered.

(*d*) It makes no provision, as noted by the Government of India, for the record of extension of cultivation, or for changes in the entries regarding *sir* and *zirat* lands, or the holdings of non-occupancy raiyats or under-tenants.

(*e*) It provides no means of recording actual but disputed transfers.

(*f*) While making the registration of certain transfers compulsory, it fails to provide adequate sanctions in case its provisions are disobeyed."

And I concluded my examination of the provisions of the Act with the following remarks:—

"It appears further to me that the main principle on which the Act is based is inadmissible in any scheme for the proper maintenance of a record of rights, in that it throws on the people the obligation to make the necessary changes in the record, instead of imposing it on an officer appointed for the purpose; or to put this in another light, it makes each individual of a vast population of agriculturists responsible for the correction of the insignificant items in the record relating to his lands, instead of holding a responsible Government official answerable for the correct maintenance of the record as a whole."

6. The following table gives briefly the figures showing the work done during the year in the three offices for the registration of mutations:—

Thana.	Office.	Registration direct under section 6.	Registration through Registrars under rule 5.	Total.	Permanent tenures.		Temporary tenures.		Holdings at fixed rates.		Occupancy holdings.		Other holdings.	
					Transfer.	Succession.	Transfer.	Succession.	Transfer.	Succession.	Transfer.	Succession.	Transfer.	Succession.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Bettiah ...	Bettiah	232	880	1,112	1	Nil.	99	6	8	1	928	9	59	1
Hajipur ...	Hajipur	1,057	1,082	2,139	Nil.	Nil.	Nil.	Nil.	373	139	1,180	288	137	22
	Mahnar	1,991	548	2,539	14	12	2	Nil.	80	53	1,433	788	88	69
	Total ...	3,280	2,510	5,790	15	12	101	6	461	193	3,541	1,085	284	92

It is of little use to compare the figures thus obtained with those that were given by my predecessor in the report for last year, as the Act was only brought into force in August 1896, but the figures show that the Bettiah office has conspicuously failed, while of the two offices in Muzaffarpur, that at Mahnar has done better than the one at Hajipur. The financial returns submitted by the Inspector-General of Registration for the year show that while the Bettiah office worked at a loss of Rs. 1,021-4-6 and the Hajipur office at a loss of Rs. 627-5-8, the Mahnar office made a profit of Rs. 753.

7. Various calculations have been made from time to time as to the number of transfers that actually take place annually by succession or sale. Sir Charles Elliott expressed an opinion, in the course of the discussions that preceded the introduction of the Land Records Maintenance Act, that the annual average percentage of such transfers on the total number of holdings in any given area would probably amount to 4 per cent. due to succession, and 4 per cent. due to sale. Mr. Allen and the Inspector-General of Registration have elsewhere calculated that 5 per cent. in each case, or 10 per cent. in all, would be found to occur. Mr. Stevenson-Moore, the Settlement Officer of North Bihar, on making a careful local enquiry into the changes that were actually to be found, after 4½ years' interval, in 13 villages in Champaran and 24 villages in Muzaffarpur, found that the annual percentage amounted in Champaran to 2 cent. due to successions and 6 per cent. due to transfers, while in Muzaffarpur they came to 1·6 per cent. due to successions, and 2·25 due to other causes. One of the reasons for these low figures is doubtless that intermediate changes have in many cases been lost sight of. Taking them as they stand, however, the following table compares the registrations that have actually been recorded in each office since its opening with those that might have been expected in accordance with these calculations:—

		Mutations to be expected.			Mutations actually recorded.
		(*a*)	(*b*)	(*c*)	
Bettiah ...	Successions ...	8,320	10,400	4,160	76
	Transfers ...	8,320	10,400	12,480	2,286
Hajipur ...	Successions ...	7,200	9,000	2,880	614
	Transfers ...	7,200	9,000	4,050	3,312
Mahnar ...	Successions ...	5,160	6,450	2,064	983
	Transfers ...	5,160	6,450	2,902	2,205

(*a*) According to Sir Charles Elliott's calculation.
(*b*) Ditto to the calculation of Mr. Allen and others.
(*c*) Ditto to Mr. Stevenson-Moore's figures.

8. Mr. Macpherson inspected the Hajipur mutation office in November 1897, and Mr. Allen inspected the Bettiah office in August and drew up a valuable note on the working of the Act, which has been submitted to the Board with my special report. I myself visited all these offices in January and February of the current year, and incorporated the results of my inspections in my report. I have also enumerated and discussed in that report a large number of proposals that have been made for the amendment of the Act and the rules, but although many of them are not open to objection, the amendments which have been most strongly pressed would, in my opinion, prove difficult and expensive to work, and are full of possibilities of harassment to the raiyats. As this question will doubtless form the subject of separate correspondence, it is perhaps unnecessary for me to say more on that subject here.

9. In addition to the work done under the Land Records Maintenance Act, the records prepared during recent settlement proceedings in other areas are maintained under various systems in each of those areas. A summary of the results obtained is given below. No special scheme has been sanctioned

for the maintenance of the records in Chittagong, where the rent-roll in temporarily-settled estates will be maintained as hitherto by the khas tahsildars and their staff. In Orissa the proposals of the Bengal Government to maintain the records by means of a local agency consisting of patwaris and kanungos, on the model of the schemes adopted in other parts of India, have been approved by the Government of India and the Secretary of State, with some important modifications. The details of the scheme are now under the consideration of the local authorities, and a Patwari Bill is being prepared.

10. It will be observed that an attempt has been made to analyse the figures in the manner directed by Government in the Resolution on the Report of this Department for 1896-97, but the figures are still very incomplete, and but little improvement is observable in registration work in many important centres. The matter still engages the attention of this Department, and further action will be taken in the current year to secure greater accuracy in this work.

The Angul Government estate.

Area	408,848·74 acres.
Tenancies	28,519
Fields	326,201
Surveyed and settled	1886–92

11. It appears that 587 mutations, on account of transfers by sale, inheritance, partition and mutual exchange, affecting 5,669 fields and 2,944·79 acres, were registered during the year. The returns submitted do not show the transfers under each class separately. These figures shew that about 2·05 of the total number of tenancies, comprising about 1·73 per cent. of the total number of fields with about ·72 per cent. of the total area were transferred. On an average one transfer covered about 9½ fields with an area of 5·17 acres. Fifty-four vacant tenancies, with an area of 100·16 acres, were resettled during the year.

Three hundred and three new tenancies, with an area of 1,679·23 acres, were settled at the settlement rates during the year.

The rules for the maintenance of the records of this estate are now under revision.

The Banki Government estate—Cuttack.

Area	75,030 acres.
Tenancies	20,053
Fields	115,775
Surveyed and settled	1888—92

12. The mutations returned for this estate for the past year number 953—all by sale—affecting 2,092 fields and 756·60 acres. The failure to register successions deprives these figures of much value, but it appears from the figures given that the sales covered 4·75 per cent. of the total number of tenancies, 1·80 per cent. of the total number of fields, and 1 per cent. of the total area. On an average one transfer covered about two fields with an area of about ·72 of an acre, the average area of a field transferred being ·36 of an acre.

No figures of re-settlements are given. Two hundred new tenancies with 394·27 acres were settled at rates fixed after consideration of the nature of the soil.

The Western Duars Government estate.

Area	788 square miles.
Number of *jotedars*	23,339
Ditto *chukanidars*	11,176
Surveyed and settled	1889–95

13. The information furnished with respect to the registration of mutations, for the four tahsils in the estate, are embodied in the consolidated table below:—

1	2	3	4	5	6	7
Number of mutations by	Sale.	Inheritance.	Partition.	Gift.	Total.	Remarks.
	642	360	6	17*	1,025	* Includes new settlements.
Number of tenancies affected.	701	392	6	17*	1,116	The percentage of mutations registered on the total number of holdings amounts to 3·23 per cent. There were 586 transfers of part holdings and 432 transfers of whole holdings.
Number of fields affected.	10,965	11,256	91	148*	22,460	
Area in acres transferred.	14,024·81	9,520·62	111·67	280·97*	23,938·07	

The above table does not include, in the total number of fields shown as transferred, the fields which were transferred in the Mainaguri tahsil. The reason of this is explained in a letter, No. 24, dated 21st April 1898, from the officer in charge of the Mainaguri tahsil to the Settlement Officer, Jalpaiguri, from which the following is extracted:—

"……You are already aware of the great difficulties the jotedars had to experience to supply khasra numbers of fields affected in applying for mutations of their names, and the consequent heavy files of the undisposed of mutation cases in all the three tahsils. The difficulty was at last set at rest by the Divisional Commissioner ordering in his No. 161R., dated 12th July 1897, that there was no necessity for recording the khasra numbers in any of them. Since then the heavy files were speedily disposed of, and no attempt is made to keep a record of the number of fields affected."

From the quotation it would appear that the same difficulty was experienced in two other tahsils, but in spite of it, it has been found practicable to furnish for them the number of plots affected by the transfers; and in the case of the fourth tahsil it is not said that any such difficulty was experienced. It is therefore not clearly understood why the difficulty was found insurmountable in the Mainaguri tahsil, and further enquiries will be made on the subject.

The price per acre transferred by sale has not been furnished, except in the case of the Falakata tahsil, where the value of land has been shown as Rs. 10 to Rs. 12 per acre.

Ninety-seven tenancies, with a total area of 2,263·81 acres, fell vacant in three tahsils, of which 29 with an area of 623·33 acres, *i.e.*, less than one-third of their total number, were resettled during the year. Some waste lands with an area of 8,029·10 acres were newly settled, either under the rules for giving leases of arable land, or at the pargana rates.

The Government estates—Backergunge.

Area	...	...	...	42,606 acres.
Holdings	...	...	...	1,733
Fields	...	...	...	48,734

14. In the 11 Government estates there were 120 transfers by sale and 7 by inheritance, affecting 10,774 fields, with an area of 6,795 acres. They bear to the whole of the estates the following proportion:—7·32 per cent. of the total number of tenancies, 22·10 per cent. of the total number of fields, and 15·94 per cent. of the total area. On an average one transfer affected about 84 fields, with an area of about 53·5 acres, and the average area of a field transferred was approximately ·63 acre. The percentage of mutations in these estates stands much higher than the percentages in other estates, and the

result generally is better this year than it was last year. There were 8 tenancies, with an area of 941 acres, to be resettled in three estates at the beginning of the year, out of which 3 tenancies comprising pasture lands were brought under khas collection, and 2, with an area of 32 acres, were resettled. A small plot of waste land was newly settled during the year.

The Burdwan Raj Khas Mahals.

Area	...	...	79,582 acres.
Tenancies	...	...	14,527.
Fields	...	...	199,499.
Surveyed and settled	...	...	1889—96.

15. It appears from the half-yearly returns submitted that 23 mutations—13 on account of transfers by sale and 10 on account of transfers by inheritance—affecting 126 fields, with an area of 57·3 acres, were registered. Taking all the mehals into account, it would appear that only ·16 per cent. of the total number of tenancies and ·06 of the total number of fields were transferred, which shows that the registration of mutations in these mahals is still little better than a farce. Each transfer covered on an average $5\frac{1}{2}$ fields with an area of about $2\frac{1}{2}$ acres, and the average size of a field transferred comes to about ·7 acre. The following extract from the Manager's report on the subject of the custom of transfer in the estate, addressed to the local authorities, serves to explain to some extent the smallness of the number of transfers shown in the returns submitted by him to this Department:—

"In the Burdwan Division the custom regarding the right of transfer at the will of the raiyat did not exist before. But it is by stealth that the raiyats have been making an effort to establish the right, and the right cannot even now be said to have been established. The person selling a holding gives possession to the purchasing tenant with the knowledge and consent of the landlord, while the purchasing tenant takes rent-receipts in the names of the tenants whose interest he has purchased. It is impossible to distinguish between a genuine *marfatdar* or agent and a pseudo-agent that the new tenant pretends to be when presenting rent. During the last three years there may have been 600 registered transfers in the mahals of the Raj, but so long as the information required under section 73 is not made compulsory, I do not see any reason why, as a landlord, I should go out of my way to enquire in the Registration Office whether any holdings have been transferred."

The Settlement Officer disagrees with these views, and gives evidence in his Final Report to show that the custom of transfer has long been established throughout the districts of this Division.

The figures of the re-settlement of abandoned and surrendered tenancies appear to be equally incomplete. Out of 677 tenancies, comprising an area of 1,716·2 acres, which fell vacant during the year, only 114 tenancies, or about 17 per cent., with an area of 338·6 acres, were resettled. 822·6 acres of waste land were newly settled with 239 tenants at rates similar to those prevailing in adjacent lands of a similar quality.

The Kujong estate—Cuttack.

Area	...	...	236,878·06 acres.*
Tenancies	...	...	32,353
Fields	...	...	169,664
Surveyed and settled	...	...	1888—90.

16. The mutation returns submitted show that there were 89 transfers registered, affecting 441 fields, with an area of 371·41 acres, as detailed below:—

By sale,—42, affecting 223 fields, with an area of 131·41 acres.
By inheritance,—45, affecting 216 fields, with an area of 237·38 acres.
By partition,—2, affecting 2 fields, with an area of 2·62 acres.

The proportion which the transfers by sale and succession bear to the figures for the whole estate stands as follows:—

By sale,—About ·12 per cent. of the total number of holdings with ·13 per cent. of the total number of fields.
By inheritance,—About ·13 per cent. of the total number of holdings with about ·12 per cent. of the total number of fields.

* This represents the area of the whole estate, of which 146,856 acres were cadastrally surveyed.

On an average each transfer by sale covered about 5 fields, with an area of 3·12 acres, and each transfer by inheritance about 4 fields, with an area of 5·27 acres, and the average sizes of fields transferred by sale and fields transferred by inheritance were about ·62 acre and 1·32 acres, respectively. The figures are clearly incomplete.

There were 101 vacant tenancies to be resettled at the beginning of the year, and during the year 73 tenancies, with an area of 159·43 acres, fell vacant, making a total of 174 vacant tenancies, with an area of 281·27 acres, out of which 29 tenancies, with an area of 45·61 acres, were resettled, leaving a balance of 145 tenancies, with 235·66 acres, unsettled at the end of the year. The number of new tenancies settled during the year was 3,512 with an area of 6,137·53 acres. The settlement was made at the rates prevailing in the villages in which the lands were situated.

The Kanika estate—Cuttack.

Area	...	...	...	281,478·40 acres.
Holdings	...	...	...	30,980
Fields	...	...	...	212,430
Surveyed and settled	...	...	...	1889—94.

17. During the year under report the following transfers were registered:—

By sale,—503 tenancies, comprising 1,208 fields, with an area of 783·35 acres, or 1·62 per cent. of the total number of holdings, ·56 per cent. of the total number of fields, and about ·27 per cent. of the total area of the estate.

By inheritance,—240 tenancies, comprising 999 fields, with an area of 1,006·62 acres, or ·77 per cent. of the total number of holdings, ·47 per cent. of the total number of fields, and about ·35 of the total area of the estate.

By partition,—9 tenancies, comprising 122 fields, with an area of 78·80 acres.

By gift,—3 tenancies, comprising 14 fields, with an area of 9·64 acres.

The average extent of each transfer was:—

By sale,—2 fields, with an area of about 1·55 acres.
By inheritance,—4 fields, with an area of about 4·19 acres.
By partition,—13 fields, with an area of about 8·75 acres.
By gift,—4 fields, with an area of about 3·21 acres.

Detailed information concerning the transfers which took place in the first half-year has not been furnished, but the report for the second period shows that a total amount of Rs. 141-2 was realized on account of mutation fees for a total area of 915·72 acres transferred by sale, inheritance, partition and gift. The number of transfers by sale was 272, of which 187 were transfers of parts of single holdings or of shares of joint holdings, and 85 of entire holdings. The total area transferred by sale was 421·31 acres, and the total sale-proceeds amounted to Rs. 6,910-3-6, which gives Rs. 16-6-6 as the average price per acre.

This estate is still under settlement.

Sujamutha Ward's Estate—Midnapur.

Area	...	...	...	27,055 acres.
Holdings	...	...	...	10,599.
Fields	...	...	...	80,000.
Surveyed and settled	...		...	1888—92.

18. There were 85 transfers of various kinds registered during the year, of which 29 were transfers by sale. The 85 transfers affected 435 fields with an area of about 158 acres. It is clear that the work of registration was very incompletely carried out, and that successions and partitions have been wholly ignored. During the year 97 holdings, with an area of 121 acres, fell vacant, out of which 38 holdings, with an area of about 52 acres, were resettled. 212 holdings, with an area of about 302 acres, were newly settled at the prevailing rates of the villages in which the lands lay.

With a view to maintain the records of this estate, the provisions of the Land Records Maintenance Act were extended by Government order No. 4609, dated 25th November 1896, to pargana Sujamutha, in thanas Bhagwanpur and Nandigram, with effect from the 1st January 1897, and the Sub-Registrars of Kajlagurh and Nandigram were appointed Registrars of Mutations under the Act. It was found, however, that the records, which were originally not very accurately framed, and which have now become obsolete in many respects, required considerable revision. His Honor The Lieutenant-Governor has accordingly directed that the records shall be revised by the Sub-Manager of the estate, and that the Act shall not be brought into operation as regards them until the Board of Revenue has declared them to be sufficiently accurate to form a basis for mutation work. This revision is now in progress.

The Dakhin Shahbazpur Ward's estate—Backergunge.

Area	...	...	... 93,297·86 acres.
Holdings	...	...	... 30,125
Fields	...	...	... 174,476
Surveyed and settled		...	... 1889—95.

19. 293 transfers by sale and 205 by inheritance, affecting 3,102 fields, with an area of 1,006·2 acres, were registered during the year. These figures give 1·65 per cent. of the total number of tenancies, 1·77 per cent. of the total number of fields, and 1·07 per cent. of the total area. Roughly speaking, one transfer on an average covered 6 plots with an area of about 2 acres, and the average area of a field transferred amounted to ·33 acre. The result, though unsatisfactory, is better than in the case of the Burdwan Raj Khas Mahals, the Sujamutha estate, or the Kujong estate. There were 15 tenancies, with an area of 128·40 acres, to be resettled at the beginning of the year, and all of them were resettled. Seventeen tenancies, with an area of 21·78 acres, were newly settled—15 according to settlement rates, and 2 at rates higher than the settlement rates.

The Maldwar estate—Dinajpur.

Area	...	...	... 88,329 acres.
Tenancies	...	...	... 10,837
Fields	...	...	... 163,110
Surveyed and settled		...	... 1888—90

20. The table below gives an analysis of the mutations registered in this estate:—

Number of applications received on account of			Number of applications rejected and disposed of.	Number of applications pending.	Percentage of applications on the number of holdings.	Whether the transfer is for the whole or part of the holdings.	Price per acre.	Number of mistakes in the original records.
Inheritance.	Sale, &c.	Total.						
1	2	3	4	5	6	7	8	9
583	460	1,043	250	793	9·62	Whole.	Rs. A. 5 12	2

Out of a total of 1,043 applications returned, it is reported that only 56, or about 5·36 per cent., were filed by the parties themselves, the rest having been filed by the patwaris. It is hoped that the heavy pending list will be cleared off at an early date, and that steps will be taken to prevent an accumulation of cases in future.

The price shown in column 8 does not include the Purnea circle, in which no transfer by sale occurred. It represents the average price per acre

calculated on the total amount of the price and the total area of the holdings in the Dinajpur Circle of the estate. The figure is probably too low. The Collector writes on this subject:—

"This can scarcely be correct. The Special Sub-Registrar informs me that in Rani Sankail thana (in which a large portion of the Maldwar estate is situated) the average price paid is Rs. 4 per bigha, or Rs. 12 per acre. This seems to be near the mark."

The exaction of fees for the record of mutations has probably affected the accuracy of the returns, especially as these fees were at first charged at very high rates. Proposals have now been formulated for a reduction of these fees, and it is to be hoped that the change will stimulate the record of mutations.

MAINTENANCE OF BOUNDARY MARKS.

21. In accordance with rule 21, Part II, Chapter 4, page 31 of the Survey and Settlement Manual of 1895, I submit the following information, supplied to me by local officers, on the subject of the action taken during the year to carry out the rules for the inspection and up-keep of permanent boundary marks.

The Burdwan Division.

22. Two of the Trigonometrical Survey pillars in Burdwan are reported to be out of repair.

The boundary marks of *ghatwali* lands in Bankura were inspected, but as these lands are now being resumed and settled, these marks have lost their former value.

In Birbhum, one Trigonometrical Survey pillar was repaired. Fourteen masonry pillars in the Kushmore khas mahals, the earthen mounds marking the trijunction points in the Mollarpur estate, and 46 pillars in the Hukumapur estate require renewal or repair.

Thorough enquiries were made as to boundary marks in Midnapur, and a list has been prepared of those which have been damaged or are not traceable. Eleven pillars in the cantonment bazar in the Midnapore town were repaired during the year. The survey marks in the Pataspur estates—recently settled—have been found on inspection to be in good condition.

In Hooghly, the Collector reports that he has made enquiries but has received no report of damages to survey marks in the district during the year.

The Presidency Division.

23. In Jessore, there are 13 Trigonometrical Survey marks which are annually repaired. The boundary pillars in the compounds of the houses of the Subdivisional Officers of Jhenida and Bangaon are in good condition, but those in the Kholaberia and Ghazipur khas mahals need repairs.

In the 24-Parganas, the iron pillars in the Government estates in the Sadar subdivision are in good condition. Some broken masonry pillars in the estates in the Basirhat subdivision are being replaced by iron ones. Three pillars in the Barasat subdivision which were not in good condition have been repaired.

The permanent boundary marks in Murshidabad were found on inspection to have sustained no damage during the year.

The Rajshahi Division.

24. In Dinajpur, out of 20 pillars which had been removed from the Dinajpur portion of the Maldwar estate, 18 were restored during the year. The boundary marks in two villages in the Purnea portion of the estate which had been removed are also being replaced.

In Rangpur, the boundary pillars between two villages of that district and the Kuch Bihar State were repaired, and are in good condition.

In Bogra, some boundary marks in the Jaipur estates were inspected in the course of enquiries in connection with the settlement of waste lands, and the village officials were directed to report if they should be damaged or removed.

In Rajshahi, the police were directed to enquire into and report on the condition of the boundary marks, and the kanungo made local enquiries with

respect to those marks which the police had reported as having been damaged, with the result that two iron pillars were found broken, one slightly damaged, one removed from its site, and two shifted from their sites and damaged by the fluvial action of the river Padma. Action is being taken to replace the damaged pillars by new ones, and to refix those which have been shifted from their sites.

In the Darjiling district, the survey marks in the hill portion of the Government estates of Kalimpong and those in the Darjeeling Terai jotes have been found on inspection to be in good condition.

The Dacca Division.

25. In Mymensingh, permanent survey marks in Government estates were inspected with satisfactory results.

In Dacca, some boundary marks have been worn out, one iron pillar has been blown down into a channel, four have been swallowed up by rivers, and two have been removed by villagers. These will all be restored.

In Backergunge, in the Dakhin Shahbazpur estates, 37 stone prisms were washed away by the river Meghna, three sank underground, and three were damaged. Enquiries are being made about them. Two damaged masonry pillars—one in the Sadar, and the other in the Patuakhali subdivision—are being repaired.

The Chittagong Division.

26. In Chittagong, all survey marks are in good condition, with the exception of two—one in char Sarat Chandra, and the other in village Benajuri—which have been washed away and cannot at present be restored.

In Tippera, inspections of survey marks showed that a few of them were missing and a few more wholly or partially damaged by villagers. Enquiries to detect the real culprits were fruitless.

In Noakhali, a very large number of pillars were posted on disputed boundaries, noticeably on the boundary between Noakhali and Tippera, and at trijunction points. There are already 250 pillars posted along the boundaries of the Government estates and 40 more will be added to them. The pillars are said to be in good condition.

The Patna Division.

27. In Muzaffarpur, the boundary posts of a few estates previously held khas, but now settled with and held by farmers or proprietors, were found in good condition, with the exception of a few which had been carried away by floods. In the Sadar and Sitamarhi subdivisions, a few posts were either damaged or washed away by the floods. In the Hajipur subdivision, with the exception of two prisms stolen by villagers, and one shifted from its proper place, the boundary marks are in good order. Enquiries are being made with a view to restore the damaged and stolen posts.

In Darbhanga, boundary marks were inspected in different parts of the district, in khas mahals, and in the Narhan ward's estates, and all were found in good condition, excepting one in the Madhubani subdivision which was not traceable.

In Saran, little has been done in the matter of the inspection of boundary marks. The Collector reports that until a patwari or kanungo agency is organized, it will not be possible for him and his small staff to give any adequate supervision to the boundary marks in 4,500 villages. One prosecution under section 53 of the Survey Act for removing a boundary mark is now pending before the Collector.

In Champaran, the Manager of the Bettiah Court of Wards and those of several factories made inspections of permanent boundary marks and found them generally in good condition; a few only were found washed away by the floods.

In Shahabad, inspection was made of the permanent boundary marks in all the Government estates where such marks exist, and with good results. With the exception of two pillars, which have probably been removed by villagers, all were found in good condition.

In Gaya, several boundary marks consisting of earthen mounds have been demolished by the rains, and some consisting of wooden posts have been damaged by insects. These will be replaced by stone pillars. The boundary marks erected after the cadastral survey in the Tikari villages in the Aurangabad subdivision are in good order.

The Orissa Division.

28. In Cuttack, no inspection was made of boundary marks.

In Puri, some inspection was made by kanungos and village sarbarahkars, and six marks were found to be missing in the Sadar subdivision. In Khurda, inspection was made by the sarbarahkars in about half the number of villages in the Government estate, with the result that some marks were found to be missing. The missing marks will be replaced.

In Balasore, chaukidars and other village officials reported that the survey marks that were known to them were in good order. To keep all marks under close supervision, 20 maps of the district have been asked for from the Surveyor-General's office.

In Angul, steps were taken to repair or reconstruct some of the pillars which had been damaged or destroyed.

The Chota Nagpur Division.

29. In Lohardaga, the trijunction pillars of nine villages were inspected by the tahsildar, who found them in their proper places, but in a state of disrepair.

In Hazaribagh, 27 masonry pillars in the Government estate of Kharakdiha and 17 pillars in the Government estate of Hata Hazaribagh were found to have been totally destroyed, and 11 pillars in the latter estate were found in a damaged condition. Steps are being taken to replace them. Two new pillars will be erected in the Hata estate in place of two old trees which have stood as boundary marks since Mr. Slack's settlement, but which have lately been completely destroyed. The boundary marks in the Dhanwar estate are in good order.

In Manbhum, all the trijunction pillars in the Mahta and Koilapal estates were inspected, and such of them as had been removed or injured were restored or repaired. There was no case of wilful removal.

In Singhbhum, boundary stones were collected to mark trijunction points during the last Kolhan settlement, and the Mundas send periodical reports as to their condition. There was one case of removal of these stones, and the guilty parties were punished.

In Palamau, the khas mahal Sub-Deputy Collector and the circle tahsildars inspected a very large number of the boundary marks and found no cases of tampering with or injury to them. The old trijunction pillars erected in 1862 are in very many instances in need of repairs. This matter will be taken in hand as soon as sanction is granted to the entertainment of the establishment required for maintaining the boundaries.

The Bhagalpur Division.

30. In Bhagalpur, the posts and pillars on the Nepal-British boundary line were inspected and repaired. There are about 13 masonry pillars along the exterior boundary line of the Tintanga Government estate, some of which were inspected.

In Purnea, the Collector reports that no steps were taken to repair the boundary pillars of the Belwa-Harinkhori Government estate, and that this will be done on the completion of the survey of the estate now in progress.

In Malda, boundary marks in the Government estates were inspected and found to be in good order.

The Deputy Commissioner of the Sonthal Parganas reports that boundary marks are regularly inspected. Some damage to these marks is reported from the Deoghur subdivision.

CHAPTER III.

UTILIZATION OF LAND RECORDS.

31. There is at present no land records staff maintained in this Province, and consequently no circle note-books are kept. The establishment of a system for the maintenance of land records in Orissa by means of patwaris and kanungos will afford material for this chapter of the Report in future years.

CHAPTER IV.

SCIENTIFIC AND NATIONAL ENQUIRY UNDER IMPERIAL CONTROL.

Botanical examination of the varieties of rape and mustard and of various leguminous crops.

32. The report of Surgeon-Major D. Prain, Superintendent of the Royal Botanic Gardens, Sibpur, on the results of his study of the races of rape and mustard grown in Bengal, referred to in the Annual Report of this Department for 1896-97, was printed during the year with his permission and published as a bulletin of this Department. At the suggestion of Sir George King, K.C.I.E., late Superintendent of the Botanic Gardens, the botanical examination of various leguminous crops, such as gram, *khesari*, *urd*, *mung*, etc., was taken up by Dr. Prain last cold weather. Samples of seeds were obtained from district officers and sown in the Sibpur Farm, so that Dr. Prain might examine the crops during their growth. His report on the subject has not yet been received. The thanks of this Department are due to Dr. Prain for the valuable assistance he continues to render us in various branches of our work.

Æschynomene Indica.

33. During Dr. Watt's examination of certain specimens of *Sola*, it appeared that *Æschynomene indica*, which was hitherto believed to yield no pith at all, was the *Sola*-yielding plant of many provinces. It was therefore suggested by him that a botanical examination should be made of all the varieties of *Sola* that exist in the different districts of the Bengal Presidency. Specimens are accordingly being collected for him by this Department.

Betel-leaf (Piper betel, pán).

34. At the request of Dr. George Watt, C.I.E., Reporter on Economic Products to the Government of India, special enquiries were instituted during the year with regard to the cultivation of the betel-leaf in several districts of these provinces, and botanical specimens in leaf, illustrative of distinct varieties, were collected by the Overseers of this Department and forwarded for classification to Dr. Watt. An interesting note on the subject was received from Mr. D. H. Kingsford, Assistant Settlement Officer, Balasore.

Betel-nut Plague in East Bengal.

35. It was reported in paragraph 31 of last year's report that Dr. Watt, accompanied by Mr. N. G. Mukerji, made a tour of inspection in the districts of Khulna, Backergunge, and Noakhali, where betel-nut trees were suffering from some disease. It is understood that Dr. Watt has found considerable difficulty in determining, on the evidence hitherto collected, the exact nature of the disease in question, and his report on the subject has not yet been completed.

Chemical Analyses of Soils, Sugar, &c., by DR. LEATHER.

36. Dr. Leather, late Agricultural Chemist to the Government of India, continued his investigations into the chemical composition of sugarcane grown on the Burdwan and Dumraon Farms during the cold weather of 1896-97.

The results of his anlayses were published in detail in June 1897 in Imperial Agricultural Ledger No. 3 ("*Saccharum*").

It was stated in paragraph 32 of the Annual Report of this Department for 1896-97 that Dr. Leather had pronounced that the well water of certain tracts

in North Bihar, which the raiyats objected to use for the purpose of irrigation, contained no elements which should prove dangerous to plant life. The Government of Bengal, in paragraph 7 of the Resolution on the above report, suggested that the correctness of this opinion might be tested by experiment. The Collectors of Darbhanga, Muzaffarpur and Champaran have accordingly been addressed on the subject, and have been asked to specify definite tracts or villages within which well water is believed by the cultivators to be injurious to their crops. When these areas have been defined, specimens of their soils, and of the water found in the village wells, will be obtained for the purpose of further analysis, and actual experiments will also be made, if possible, with crops grown locally.

Saline efflorescence or reh in North Bihar.

37. Arrangements are being made to obtain specimens of soils affected by reh in North Bihar with a view to their analysis. Should they prove similar in all respects to those which have been so extensively experimented on in other parts of India, it may be possible to find means of utilising a considerable area which is now left waste.

Cultivation of rhea in Bengal.

38. It was reported in paragraph 34 of last year's report that Dr. Watt had made a tour through certain districts of Bengal where the *rhea* fibre plant is grown, or where it seems likely that its cultivation might be extended. It is understood that the results of his tour in Eastern Bengal are being incorporated in a revised edition of the Agricultural Ledger on *rhea*.

Collection of articles for the Indian Museum and Imperial Institute, London.

39. During the year under report specimens of 56 economic products were collected by the Overseers of this Department, under the instructions of the Assistant Directors, for the Imperial Institute, London, and were forwarded to the Reporter on Economic Products to the Government of India. The cost of the collections amounted to Rs. 251-6-9. A list of the products of which specimens were collected is appended to this report.

40. Specimens of 172 different kinds of paddy, collected by Mr. J. G. Cumming, C.S., in the Chakla Roshnabad Estate in the districts of Tippera and Noakhali, were made over to the Secretary to the Trustees of the Indian Museum. The Trustees have cordially thanked Mr. Cumming for his donation, and His Honour the Lieutenant-Governor has expressed the opinion that much credit is due to him for the industry and care he has devoted to the collection.

Bengal Veterinary Department—Cattle-breeding.

41. The work of the Civil Veterinary Department has been separately reported on by Veterinary Captain Raymond, Superintendent, Civil Veterinary Department, Bengal, and his report has been recently submitted to Government with my review. It contains a full account of the action taken by the Department in the matter of cattle-breeding, and I need not repeat the information contained in it here. The improvement of the physique of the draught cattle of Bengal, which has been gradually deteriorating for many years past, continues to engage the earnest attention of the Department, and efforts are being made to enlist the co-operation of all branches of the Administration and of the leading zamindars of the province in the action to be taken with this object.

CHAPTER V.

SCIENTIFIC AND LOCAL ENQUIRY UNDER PROVINCIAL DIRECTION.

Analysis of districts.

42. As mentioned in paragraph 38 of last year's report, the districts for which special reports have been prepared by Assistant Directors in previous

years, are Burdwan, Dacca, Cuttack, and Lohardaga. The writing of the report on the Shahabad district, which stands next on our list, has not yet been commenced.

Experimental Farms.

43. Three experimental farms were maintained under the supervision of the Department during the year under report, one at Sibpur near Calcutta, the second by the Maharajah of Burdwan at Burdwan, and the third by the Maharani of Dumraon at Dumraon in Shahabad. The farms were, as in previous years, under the immediate management of Overseers, who worked under the instructions of the Assistant Directors of this Department. Mr. Nagendra Nath Banerjei held charge of the Burdwan and Dumraon Farms throughout the year. Mr. Bhupal Chandra Basu was in charge of the Sibpur Farm up to the 13th September 1897, when he was transferred to Assam. For the remaining period of the year the farm was under the supervision of Mr. Nitya Gopal Mukherji. The Sibpur Farm has now been made over to the Principal of the Civil Engineering College for the use of the agricultural classes recently established. Details of the experiments conducted in the above-named farms will be found in the farm reports for the year, which will be published separately, and an abstract only of the chief operations undertaken in each of the three farms is given below.

The Sibpur Farm.

44. This farm has been made over to the Department of Public Instruction for conversion into a demonstration farm for the Agricultural classes opened in June last, the purpose for which it was originally established. The variable composition of the soil of the farm has been pronounced by Dr. Leather to be unsuited to the purposes of an experimental farm, as it is impossible to make any reliable comparison between the results obtained from different plots.

The work done during the year under report consisted of experiments with manures, with new crops, and new varieties of crops, with new and improved implements, and in methods of cultivation. Attention was also given to the conservation of manures in properly constructed pits. Seeds and implements were also distributed. Dr. Prain again very kindly co-operated with this Department by making a systematic study of the botanical characters of the different kinds of leguminous crops grown in these Provinces. The results of his enquiries have not yet been published.

(1) *Manure experiments.*—The manure experiments were made with (i) oats, (*ii*) potatoes, and (*iii*) cabbages, but decisive results were obtained with cabbages only. With this crop it was found that the highest outturn was obtained by the use of saltpetre; but the difference in the effect of this manure and castor-cake, with which it was contrasted, was not so marked as in the previous year.

(2) *New crops and new varieties of existing crops.*—Among the new crops tried on the farm were (*i*) mulberry and (*ii*) cassava, both of which did very well. From nine cassava plants as much as 45½ pounds of dry flour were obtained. (*iii*) Four kinds of maize were tried during the year, viz., (*a*) American, (*b*) *Dhappa* (a local variety), (*c*) *Keorabani* (local) and (*d*) a Cawnpur variety. The Cawnpur variety appears to have been the most successful. (*iv*) Sirajganj jute was, as in the Burdwan Farm, found to be superior to country jute. (*v*) Chinese cabbage, tried as a rainy-weather crop, did not succeed, but it grew very well during the cold weather. (*vi*) Guinea grass, (*vii*) *Reana Luxurians* and (*viii*) *Sorghum Saccharatum* were again successfully grown as fodder crops.

(3) *New and improved implements.*—The Sibpur plough and the Sibpur hoe were used on the farm during the year. The Sibpur plough, though it has proved unpopular with cultivators in the mufassal, has been used here with good effect, but the Sibpur hoe requires some modification, as it has been found that the knives being horizontal only cut the weeds instead of uprooting them, and form a surface pan. The Eclair vaporisor and American spraying bellows were used for applying insecticides and fungicides and gave satisfaction.

(4). *Methods of cultivation.*—(*i*) The effects of deep and shallow ploughings were tried on barley and jute, but, as in previous years, no conclusive results were obtained. (*ii*) The comparative merits of the two systems of planting whole tubers and planting cut sets of potatoes were again tried last year. The actual outturn from the plot planted with whole tubers was slightly larger than that from the plot planted with the same number of cut sets, but the financial results were distinctly in favour of cut sets. (*iii*) Similar results were obtained in the experiment in which the system of planting in double rows was contrasted with that of planting in single rows, as well as (*iv*) in the experiment wherein the method of thick-sowing was contrasted with that of thin-sowing. The system of planting seed-potatoes in double rows, as well as that of planting them thick, gave a heavier yield, but did not prove as profitable financially as the contrasted methods. (*v*) The ratooning of the *khari* variety of sugarcane was again successfully carried on in the farm.

(5) *Receipts and expenditure of the farm.*—The gross expenditure of the farm amounted last year to Rs. 3,159-3-9, against Rs. 3,917-11-4 in the previous year. The receipts amounted last year to Rs. 1,100-9-9, against Rs. 1,005-7-9 in the previous year.

The Burdwan Farm.

45. Experiments were conducted last year in this farm with manures, seeds and implements, as in previous years.

(1) *Manure experiments.*—The effects of different manures were tried on paddy, sugarcane, jute and potatoes.

(*i*) Experiments were made in duplicate to try the effects of the different manures, (*a*) cowdung, (*b*) castor-cake, (*c*) bonemeal, and (*d*) a mixture of bonemeal and saltpetre, on paddy. As usual a mixture of bonemeal and saltpetre (at the rate of 3 maunds of bonemeal and 30 seers of saltpetre per acre) yielded the best results, and bonemeal alone gave the next best results. This was also demonstrated in the second series of the same experiments which was started last year. In both the series, cowdung also proved to be a very good manure for paddy, and gave a high net profit. In fact, so far as the practical value of the manures is concerned, there seems to be little to choose between cowdung and a mixture of bonemeal and saltpetre.

Experiments were also made to test the relative merits of manuring paddy with cowdung and with jute ploughed in. There was no marked difference noticeable in the results in the contrasted plots, though both the plots gave about double the outturn obtained from the unmanured plots. Last year the jute ploughed in was 2 feet high, instead of 9 inches, as in the two previous years, and, as might be expected, it gave slightly better results.

(*ii*) The effects of the different manures, viz., (*a*) bonemeal, (*b*) *super* and cowdung, (*c*) cowdung and bonemeal, and (*d*) cowdung alone, were tried on the local *shamshara* variety of sugarcane. Bonemeal and cowdung produced the largest yield of *gur*, which gave the poorest yield in the previous year, when a mixture of cowdung and *super* gave the best results. Cowdung proved to be next best. This experiment was started last year and must be continued for several years before any conclusions can be drawn.

(*iii*) Manure experiments with Sirajganj jute were made in duplicate. The effect of (*a*) cowdung, (*b*) castor-cake, (*c*) saltpetre and *super*, and (*d*) bonemeal were tried on jute. Cowdung has always yielded the best results in both the series.

(*iv*) The manurial values of (*a*) castor-cake, (*b*) cowdung, and (*c*) bonemeal on potatoes were tested. Castor-cake gave the best results last year, as in the previous year, whereas cowdung had proved most beneficial to the crop in the two preceding years. In fact, as a good manure for potatoes, there seems to be little to choose between cowdung and castor-cake. The manured plots gave over four times the outturn of the unmanured one.

Another series of experiments was started in 1895-96 to test the value of pitted cowdung. Two plots of the same area, viz., 5 cottas each, were manured with 600 maunds of pitted cowdung and the same quantity of cowdung purchased from the raiyats respectively, and both the plots were sown with potatoes and received exactly the same treatment. The higher manurial value of the former over the latter was demonstrated again last year, as in the previous year.

(2) *Trials with improved implements.*—The improved implements tried on the farm during the last year were (i) the Sibpur plough, (ii) the American hoe, (iii) the Behia sugarcane-crushing mill, and (iv) the Behia shallow pan for boiling cane juice.

(*i*) The Sibpur plough gave decidedly better results than the country plough in the plot manured with saltpetre, but in the plots manured with bonemeal, and in the unmanured plots the results were about equal.

(*ii*) The American hoe was used in hoeing potato fields, and gave satisfactory results.

(*iii*) The Behia sugarcane-crusher also gave good results as usual.

(*iv*) The Behia shallow pan has been tried for making *gur*, but the raiyats have not yet adopted it, as they say it is a little more expensive to boil the juice in this pan than in the country pan they ordinarily employ.

(3) *Experiments in methods of cultivation.*—Experiments were made under this head with paddy, sugarcane, and potatoes.

(*i*) Experiments were made with paddy to test the relative merits of thick and thin sowing. In this experiment the outturn of grain has been found to be about equal in the contrasted plots, though the yield of straw is slightly higher in the former case. Another experiment was made in duplicate to test the value of selecting seeds. All the plots were unmanured. The outturn from selected seeds was found to be slightly better.

(*ii*) With sugarcane, the trench-planting system *versus* the country system was again tested. But the experiments failed on account of the land being waterlogged from the end of June to the end of September. The ratooning of *khari* sugarcane was again tried successfully, and the yield from the plot wherein the ratooning was tried was more than double that from the contrasted plot resown annually, and the net profit was much higher.

(*iii*) With potatoes, the advantages of planting cut sets as against whole tubers were tested in three series. In the first series, 2,689 cut sets, and the same number of whole tubers, were used as seed. The weight of cut sets per acre was 15 maunds and that of whole tubers 36 maunds. The yield from the plot where the whole tubers were planted was at the rate of nearly 300 maunds per acre, against about 250 maunds per acre in the plot where the cut sets were used. But whereas in the latter case there was a clear profit of Rs. 62 per acre, there was a loss of about one rupee in the former case. The experiment was duplicated in another series, where a smaller quantity of cut sets and whole tubers were sown. The results were similar. In the third series, 15 maunds of cut sets, and the same weight of whole tubers respectively, were sown in two plots. The plots in which cut sets were sown showed a slightly better outturn. Each of the above six plots was manured with a mixture of cowdung and castor-cake at the rate of 30,480lbs. of cowdung and 1,820lbs. of castor-cake per acre.

(4) *Experiments with new crops and varieties of crops.*—Experiments under this head were made with paddy, sugarcane, maize, potatoes, and *sorghum*.

(*i*) The same six varieties of paddy were tried as last year, besides the long-stemmed paddy, which was obtained from Faridpur, and some varieties obtained from Ceylon. As in last year, the best yield obtained was that from the local *Bansmati* variety, and *Kartic sál* gave the next best results. Long stemmed paddy and Ceylon paddy did not yield good results.

(*ii*) Four varieties of sugarcane were tried last year under the direction of Dr. Leather. Fresh canes were obtained from Poona for cuttings and contrasted with 3 local varieties, viz., *Puri*, *Kajli*, and *Shamsara*. *Shamsara* gave the largest yield of *gur*, and next came the Poona variety.

(*iii*) Three varieties of potatoes were tried, viz., Darjiling, Naini Tal, and a Patna variety called *amargachi*. The last-mentioned variety yielded the best outturn, but it is of inferior quality and fetches a lower price in the local markets than the hill varieties. It has the advantages at the same time of being an acclimatized variety, the seed of which can be easily stored and preserved, and of requiring less careful cultivation than the imported potatoes. It may consequently prove the best variety to introduce into districts in which potato cultivation is as yet unknown, but in which the soil and the climate appear favourable to the growth of this crop. This question will receive further attention in the present year.

(*iv*) American and country maize were tried, but with indifferent results.

(*v*) Two plots were sown with *sorghum*. Of the two varieties called black-seeded and red-seeded, respectively, the former gave a better outturn.

(5) *Conservation of cowdung.*—Cowdung was stored as in previous years in properly-constructed pits.

(6) *Ensilage.*—An experiment in ensilage with sugarcane leaves did not prove a success.

(7) *Distribution of seed and manures.*—186 maunds of seed potatoes and 87 maunds of castor-cake, for manure, were sold to 136 raiyats in 26 villages in the neighbourhood. Besides this, several raiyats purchased seed from some residents of the villages of Totpara and Ameerpur who have started a trade in Naini Tal potatoes and castor-cake. 30 maunds 25 seers of paddy seed were sold to other private persons, to wards' and Government estates, and to other experimental farms, and some Poona sugarcane cuttings were also sold.

(8) *Receipts and expenditure of the farm.*—The receipts for the year amounted to Rs. 1,181-0-3, against Rs. 1,632-3-6 of the last year, and the expenditure was Rs. 2,539-6-9 against Rs. 2,237-7-9.

The decrease in the receipts is partially due to the recent fall in the price of agricultural produce generally. The increased expenditure is due to the breaking up and plotting of new lands for experimental purposes, and to the purchase of some farm implements.

The Dumraon Farms.

46. Two farms were maintained during the year at Dumraon, one at Pareswana, originally started in the year 1885-86, and one near the railway station, established in 1894-95 at Dr. Leather's suggestion, the soil of the former farm being considered unsuitable for experimnetal purposes.

During the year under report, only ordinary cultivation was carried on at Pareswana, the crops grown being wheat, gram, paddy, sugarcane, and *harfar*, *i.e.*, those which had already succeeded when the farm was maintained for experiments alone. The receipts of this farm amounted to Rs. 636, and the expenditure to Rs. 277. There was thus a clear net profit of Rs. 359, which was obtained from the cultivation of 13 acres of land.

The work done on the new farm comprised experiments with manures, implements, and new varieties of existing crops. Improved agricultural appliances were also put to the test, and much attention was devoted, as before, to the proper conservation of manure and to the distribution of selected seed among cultivators.

(1) *Experiments with manures.*—Three experiments were designed under this head to test the relative value of different manures for paddy and wheat. The manures used for the paddy crop were cowdung, ashes of cowdung, and bonemeal. These were applied with reference to their nitrogenous composition. Ashes of cowdung gave the best results, next to it in manurial value came cowdung, and then bonemeal. The first two manures raised the crop two-fold, the outturn of grain per acre obtained by their application amounting to 2,132lbs. and 2,010lbs., respectively, against 1,002lbs., the outturn obtained without the use of any manure. It was also found that the cost of the manures was more than recouped by the increase in outturn. Bonemeal proved a less useful and a more expensive manure, and yielded an outturn of 1,670lbs. of grain per acre. These figures compare very favourably with the average yield of paddy obtained by neighbouring cultivators in the same season, which is estimated by the Overseer in charge of the farm at 820lbs. per acre.

In one experiment with wheat, the manures tested were cowdung, ashes of cowdung, ashes of cowdung and saltpetre, bonemeal, town sweepings, and green manures, all of which were applied in such quantities as to supply 50 lbs. of nitrogen per acre. The results obtained corroborated the experience of the previous two years as regards the value of cowdung as a manure for wheat. The outturn of grain from its use amounted to 1,805 lbs. per acre, and the average of the unmanured plots amounted only to 485 lbs. per acre. The net profit from the plots manured with cowdung, after deduction of all costs of cultivation, manuring, and harvesting, amounted to Rs. 32 per acre, while the unmanured plots showed a loss of Rs. 6 per acre. The use of cowdung thus proved distinctly profitable. Ashes of cowdung and saltpetre, though producing a high outturn, did not prove very profitable, owing to the high price

of saltpetre. The experiment with green manure was unsuccessful, the failure being due to various causes, but it will be repeated in the current year. Town sweepings gave fairly good results in 1896-97 and in 1897-98, the average of these two years amounting to 1,625 lbs. of wheat per acre. Bonemeal and ashes of cowdung gave about equal results, coming next in manurial value to town sweepings.

The results of a second experiment with wheat tended to show that cowdung manure does not take much effect on wheat unless the land to which it is applied is irrigated. During the past three years the outturn obtained by the use of the manure on unirrigated land has only shown a nominal excess over the outturn obtained from unirrigated land which is not manured; and it may be noted that the average outturn of grain during the same period in a plot irrigated and manured with cowdung amounted to 1,465 lbs. per acre, while another plot which received the same quantity of cowdung as manure, but was not irrigated, produced 582 lbs. per acre only.

(2) *Trials with new and improved agricultural appliances.*—The Crosskill clod-crusher, an English grinding mill, an English chaff-cutter, the Behia 3-roller sugarcane mill, and the Planet (Jr.) hoe continued to give satisfaction. The clod-crusher did the work of a thresher to complete satisfaction, and the Planet (Jr.) hoe was found useful for working between rows of plants. The Sibpur hoe was not found as useful. The Sibpur iron plough has not proved a conspicuous success on this farm. The trials made seem to show that it is more useful for wheat lands than for paddy lands. There is no real demand for it from the raiyats, who find it too heavy for themselves and their bullocks. In the current year I propose to make extensive trials of the Martin, the Weston, and the "Baldeo improved" ploughs, and will report the results in due course.

(3) *Experiments in improved methods of cultivation.*—The experiments made with Naini Tal potatoes, in order to compare the merits of whole tubers and cut sets as seed, resulted in a higher outturn from the use of whole tubers, 178 maunds (14,645 lbs.) per acre being the yield from whole tubers, and 146 maunds (12,015 lbs.) per acre being the yield from cut sets. The extra cost incurred in the purchase of whole tubers for sowing was, however, not covered by the heavier outturn.

(4) *Experiments with new varieties of existing crops.*—The experiments under this head were made with the object of ascertaining the relative merits in point of productiveness and quality of different varieties of paddy, wheat, potatoes, cotton, maize and *bajra*—

(*a*) *Paddy.*—The local variety of fine paddy known as *bansmati* proved to be nominally superior in point of outturn to the other varieties with which it was contrasted, such as Diamond Harbour paddy and *Bataspheni* paddy. The Dehra-Dun fine paddy commended itself to cultivators as coming to maturity very early.

(*b*) *Wheat.*—Out of ten varieties of wheat which have been grown experimentally for the last three years, it has been found that the local and Punjab varieties, and the Muzaffarnagar white variety, have been the heaviest producers. The varieties imported from the Central Provinces have proved to be the poorest producers at Dumraon. The Muzaffarnagar red variety has also proved an inferior wheat.

The details of production for the last three years during which the experiment has been tried are given in the following statement:—

Name of variety.	Outturn of grain per acre.		
	1895-96.	1896-97.	1897-98.
	lbs.	lbs.	lbs.
Buxar (white)	560	1,475	1,705
Do. (red)	525	1,715	1,365
Muzaffarnagar (white)	525	1,400	1,840
Ditto (red)	475	955	875
Punjab (white)	555	1,385	1,005
Do. (red)	565	1,365	1,085
Houra (white, Central Provinces) ...	435	980	465
Sconipisi (white, Ditto) ...	395	1,030	460
Katha (red, Ditto) ...	167	515	360
Harda (red, Ditto) ...	185	1,050	255

The varieties of the Central Provinces have been found to be most liable to rust. The Muzaffarnagar white variety has proved to be the best rust-resisting wheat on the farm. The local Buxar varieties and the Punjab varieties have also shown themselves to be comparatively good rust-resisting wheats.

(*c*) *Potatoes.*—As in the previous year, Naini Tal potatoes proved to be superior in point of productiveness to the local varieties, such as Ghazipur and Bettiah; but Cherrapunji potatoes did not give good results. It would be well to make a trial of the *Amargachi* variety that has yielded such excellent results in Burdwan. The outturn obtained during the two years from the different contrasted varieties was as follows:—

Name of variety.	Outturn per acre.			
	1896-97.		1897-98.	
	Mds.	lbs.	Mds.	lbs.
Naini Tal	197	(16,215)	146	(12,005)
Ghazipur	177	(14,585)	98	(8,070)
Bettiah	164	(13,475)	92	(7,565)
Cherrapunji	131	(10,810)	37	(3,010)

(*d*) American cotton was tried, but did not prove successful. Egyptian cotton was grown on *deara* lands after the subsidence of flood water. The plants germinated well and are thriving. The crop is also being tried as a rainy-weather crop. American maize failed owing to unusually heavy rain in July. Guzerati *Bajra* gave fairly good results.

Besides the above crops, oats and *jowar* were also grown with success, the latter being used as fodder for the farm cattle.

(5) *Conservation of cattle dung.*—In the absence of *pucka* pits, for which funds were not forthcoming, cattle dung and urine were conserved carefully in *katcha* pits under a thatched roofing.

(6) *Distribution of seed.*—Much attention has been paid of recent years to the distribution of good selected seed among the raiyats of Dumraon. In 1893-94, the wheat crop in the Shahabad district sustained an almost total failure, owing to a severe attack of rust. In the following year accordingly 250 maunds of Muzaffarnagar seed-wheat, of the white soft variety, were imported from the North-Western Provinces, and distributed at cost price among 300 tenants in various parts of the district. Rust reappeared in 1894-95, but it was found that the Muzaffarnagar wheat suffered less than the local varieties. The raiyats were pleased with their comparative success, and in 1895-96 it was found possible to distribute among them 330 maunds of fresh imported seed of the same variety, at a price which included costs of transit from Muzaffarnagar to Dumraon as well as the cost of the seed. The Muzaffarnagar white variety is now extensively grown in Shahabad.

The introduction of Naini Tal potatoes has not been as successful in Dumraon as at Burdwan, but the cultivators recognise that there are varieties of potatoes to be had superior to those that they have been cultivating hitherto, and they have now begun cultivating Furrukhabad potatoes. The Overseer of the farm reports that these potatoes are very similar in shape and quality to the Naini Tal potatoes.

The *khari* variety of sugarcane, which has given such good results for several years in the Burdwan Farm, and which was tried with success at Dumraon in 1895-96, has found favour with the raiyats of Dumraon. Several other soft varieties of cane which were imported from the Burdwan Farm in 1895-96 have also attracted the notice of the cultivators, and no less than 130 kahans of cuttings were sold to them during the sowing season of 1896-97. Very few cuttings were sold by us during the past year, but it is understood that a large number of these cuttings changed hands among the raiyats.

(7) *Receipts and expenditure.*—The total cost of the maintenance of the two farms at Dumraon, amounted during the year under report to Rs. 2,939, against Rs. 2,503 incurred in the previous year. The receipts in 1897-98 amounted to Rs. 1,313, against Rs. 1,283, the receipts of the previous year.

Agricultural experiments and the introduction of new and improved Staples in Government, Wards', and Private estates.

47. During the year 1897-98, a sum of Rs. 10,050 was sanctioned by the Board for agricultural experiments and agricultural improvements in Wards' estates under Government management. The sums allotted for similar expenditure in Government estates were not shown separately in the estimates for the year, but were amalgamated with those allotted for miscellaneous improvements—a system which too frequently leads to the disappearance of the share due to agriculture, and which is consequently to be regretted. A brief account of the agricultural experiments of various kinds undertaken, assisted or encouraged by this Department, during the year, in Government, Wards', and private estates is given below. These efforts to improve the agriculture of these estates were very insignificant as compared with their area and revenue, and they frequently failed from wholly avoidable causes. The Managers of Government and Wards' estates have, with a few exceptions, been found hitherto to take but little interest in the experiments, and to appreciate imperfectly the objects which they are designed to attain. In one case a Manager has informed this Department that the soil of the estate in his charge was unsuited to any kind of agricultural experiment, while in another the Manager found fault with the trained *mali* sent down by us to assist in introducing the cultivation of sugarcane and potatoes, because he knows nothing about flowers. It has been found also that the funds set apart for agricultural experiments and improvements, small as those funds are, are frequently expended in the maintenance of an English vegetable garden, or in the cultivation of the proprietor's private lands; and in few cases is it realised that when the soil, the cattle, and the cultivators are poor, there is the more reason for sustained efforts to introduce fresh crops and manures, selected seed, improved implements and a better breed of cattle. In the Government Resolution on the last Annual Report of this Department, attention was drawn to this subject, and His Honour the Officiating Lieutenant-Governor expressed a hope that future years would see increased exertions in this matter, with results beneficial to the agricultural community at large. I have accordingly arranged that the tours of my Assistant Directors and of the Travelling Overseers shall be planned with special reference to the inspection of all such experiments, and I am taking the opportunities afforded me of discussing the subject with the Collectors of districts and the officers in charge of these estates during my own tours. Signs are not wanting that many land-holders are anxious to do something for agriculture within private estates, and we have received several applications for advice and assistance from gentlemen proposing to establish model farms or to introduce improved varieties of crops or implements. I have some hope therefore that we may be able to record an advance in future reports, though progress in all agricultural matters must necessarily be slow.

Burdwan Division.

48. *Midnapur Government Estate.*—An experiment with Naini Tal potatoes in this estate was not successful, owing to the seeds being sown too late. Cabbages, cauliflowers, raddish, turnips, and *patals* were experimentally cultivated with a fair amount of success.

Wards' estates.—Various small experiments were undertaken in these estates, but they were not as a rule carefully conducted, and met with little success in consequence.

Presidency Division.

49. *24-Parganas.—Bhawanipur Wards' estate.*—Potatoes were grown during the year 1897-98 in the Sundarban portion of the estate. The result has been very satisfactory, the potatoes having grown well in a saliferous soil, and the raiyats having begun to cultivate them. It has been pointed out to the Manager that the manure used, viz., at the rate of 50 maunds of cowdung, 17 seers of oilcake and a few baskets of old mudwall earth per bigha, was insufficient. The cultivation of sugarcane was also tried on a small scale in this

area, but the plants were destroyed by wild pig shortly after the shoots had come out. *Patal* was grown with success.

Nadia.—The Subdivisional Officer of Chuadanga was supplied by this Department with 2 maunds of Naini Tal seed-potatoes, which he distributed among several persons in the subdivision for experimental purposes. The results of the experiments in some cases were very satisfactory. In one case, the outturn is reported to have amounted to as much as 100 maunds per bigha.

Khulna.—Babu Raicharan Bose of Bagirhat, who tried the cultivation of Naini Tal potatoes, reports that the experiment was unexpectedly successful, and he intends to continue it in the present year.

Rajshahi Division.

50. *Dinajpur.—Maldwar Wards' Estates.*—Buxar wheat was tried with success on a small scale at Ramganj in the Maldwar estate. It is reported to be suited to the soil. Some English vegetables were also grown in the estate with a fair amount of success. Some mango grafts were planted and plantain trees introduced in the estate gardens.

Jalpaiguri.—Government Estates.—Fifty-five maunds of Naini Tal potatoes and some seeds of peas, gram, pulses, and English vegetables were supplied by this Department for experimental cultivation in the tahsils of the Western Duars. The results of the experiments were not statisfactory, owing partly to late sowing and partly to the want of proper treatment of the soil. White ants were responsible for the failure of the crop of sugarcane which was tried in the Falakata tahsil during the year. Further experiments with sugarcane are, however, being made.

Darjiling.—Governemnt Estates.—Lucerne seeds were tried in the Darjiling Jail garden, but they did not germinate. The Deputy Commissioner intends to repeat the experiment. The experiment in foreign grasses tried by the Deputy Commissioner in the Kalimpong khas mahals did not result in the discovery of any grass that would flourish in the dry season. Nepal chillies and maize were grown with great success, but the cultivation of beans and peas was not successful. An attempt was made to introduce the cultivation of lac into the Kalimpong khas mahals, and for this purpose two lac cultivators were brought from Chota Nagpur. This experiment was undertaken somewhat prematurely and without sufficient preliminary enquiry into the circumstances in which the wild lac which is indigenous to the district is found to flourish. The imported cultivators were unsuccessful in their efforts to acclimatize the lac they brought with them, and have since returned to Chota Nagpur. Enquiries have now been set on foot, with the help of the Forest Department, as to the trees on which the indigenous lac is found, the elevation at which it flourishes, and its quality from a commercial point of view.

Pabna.—Babu Gyanendra Kumar Sanyal of Salap, in the district of Pabna, has been making an experiment in the cultivation of *rhea.* The plants are reported to be healthy. The final result will not be known till next year.

Dacca Division.

51. *Faridpur.*—Potatoes were grown experimentally in some of the Government estates and in the jail garden, but with indifferent results.

Backergunge.—An attempt was made to introduce the cultivation of potatoes among the raiyats in the district by growing it in several khas mahals. Though the crops mostly failed on account of bad seeds, late sowing, and other causes, there appear to be grounds for believing that the agricultural conditions of the district are not unfavourable to the growth of potatoes, and the raiyats are beginning to take an interest in the experiments. One of the khas tahsildars has written a very useful and handy pamphlet on the subject of potato cultivation. A hundred copies of this pamphlet, which has been published in the vernacular, have been purchased and distributed by this Department.

Mymensingh.—Naini Tal potatoes were tried with fair success in the jail garden of the district.

Chittagong Division.

52. Twenty-four samples of tobacco grown in several districts of the Chittagong Division during the year before last were sent to the Secretary to

the Agri.-Horticultural Society of India for appraisement. The appraiser reports that the leaves are all imperfectly cured, and in most cases appear to have sweated during the process of curing, which has had the effect of more or less rotting them and entirely spoiling the texture, and that they are suitable only for making up into Burma-shaped cheroots such as are made in Calcutta from Rangpur and other tobacco. Another defect in the samples is the quantity of dust and sand on and ingrained in most of the leaves. The soil and climate of the tracts where the tobacco was grown are considered unsuited to the growth of fine tobacco. The appraiser is of opinion that, though the flavour and texture of the leaves could be considerably improved by proper curing, it would not result in a commercial success as far as the export trade of tobacco is concerned, and that it could not compete in London either as pipe or cigar tobacco. Of the samples sent, two varieties of Kaira are pronounced to be the best and to have been more carefully cured than the others. Although this report is unfavourable, it was not to be expected that a first grade tobacco, fit for the London market, could be produced in Chittagong, at least in the early days of the industry, but as there is a large sale for such a product as that described by the appraiser, there is no reason why the crop should not prove an eminently profitable one to the cultivators.

Tobacco was also grown during the year under report in the estate of Fazl Ali Khan. The result is reported to be fair. Nadia chillies and English vegetables were also grown in this estate with the usual success.

Sugarcane cultivation was undertaken in the Raujan Khas Tahsil, but the plants were destroyed by the cyclone of the 24th October 1897.

Noakhali—Government Estates.—Potatoes, cabbages, cauliflowers, peas and ground nuts, and three varieties of sugarcane, viz., Bombay, *Khari* and *Shamsara*, were successfully grown in the circuit-house compound. Experiments were also made with wheat, barley and oats with indifferent results. Naini Tal potatoes were also tried in Government estates with success.

Wards' estates.—Naini Tal potatoes were tried with success in the different circles of Miss Courjon's estate, and the Manager hopes that the tenants will take up their cultivation. Barley, maize and ground-nuts were also tried in this estate with fair success.

Patna Division.

53. *Patna—Maghra Ward's estate.*—Some fairly successful experiments were made with Darjiling potatoes by the raiyats of one village in this estate, and the General Manager of the Wards' Estates, Patna, expects that the continuous cultivation of potatoes for some years will meet with success, and will induce the cultivators to grow them extensively.

Gaya.—Government estates.—Some small experiments with potatoes and sugarcane were made but were not successful.

Tikari Ward's estates.—The Cawnpur sugarcane planted in 1896-97 promised well at first, but subsequently withered. As the same fate befell some crops of the local variety of sugarcane in the neighbourhood, this result is not conclusive as to the suitability of the Cawnpur variety to the soil of the district. Different varieties of Burdwan paddy were grown experimentally in the estate, and the result of this important experiment was most satisfactory. They are pronounced to be superior to any variety that grows in the locality, and the Manager proposes to distribute for experimental cultivation the whole of this year's outturn, 882 local maunds, over the Estate's zamindari during next season. Muzaffarnagar wheat was also experimented with, but without much success.

Shahabad.—Some carrot-seed obtained from the Director of Land Records and Agriculture, North-Western Provinces and Oudh, was tried in the compound of the Sher Shah garden in the Sasaram subdivision, but the results were unsatisfactory.

Champaran.—The Manager of the Bettiah Raj obtained some English carrot-seeds from the Director of Land Records and Agriculture, North-Western Provinces and Oudh, and offered them free of cost to the raiyats. Only a few of the better class of raiyats took advantage of the offer, but as their experiments were very successful, a more extended cultivation of these carrots may be hoped for this year.

Darbhanga.—In the Narhan Ward's estates, 40 bighas of land were sown with gram and oats, with a view to test the effect of certain manures upon these crops. The result of the experiment was not satisfactory.

Bhagalpur Division.

54. *Bhagalpur—Government estates.*—An experiment with Naini Tal potatoes in the Tintanga estate failed for want of proper irrigation.

Purnea—Government estates.—Here also an experiment with Naini Tal potatoes was made, but did not meet with great success.

Ward's estate.—Carrots, *janera*, and oats were grown for experimental purposes with success in the Khagra ward's estate. A large number of young trees of *Eucalyptus citriodora* and *globulus* have also been raised from seeds, and are reported to look very healthy. The weeping willow and certain kinds of acacias have also been introduced.

Orissa Division.

55. *Cuttack.—Government estates.*—The cultivation of the Naini Tal and of a local variety of potatoes was tried with success in the Banki Government estate. The Commissioner reports that as the soil of Banki appears to be well suited to the potato crop, it is under contemplation to supply seeds *gratis* to some selected raiyats of the estate, so as to induce them to take to its cultivation. The introduction of the *khari* variety of sugarcane into this estate has proved a decided success, and the crop is now largely grown by the tenants. Previous attempts to grow local and other varieties of sugarcane in this estate proved unsuccessful, owing to the destruction of the young canes by floods, but the *khari* variety has been found strong enough to withstand these floods, and its popularity is now assured.

Wards' estates.—The experimental cultivation of *shamsara* sugarcane has been started in the Kanika estate, but the Collector is doubtful about its success. The result will be known next year. Different varieties of sugarcane were experimented with in the Kujong and Madhupur estates, and the result is reported to be satisfactory. It is reported that the raiyats have begun to take an interest in the cultivation of the *shamsara* and other imported varieties of sugarcane, and to grow this crop on their own account. Naini Tal potatoes were also tried on a small scale in the Kujong estate. The Collector reports that they will be more extensively cultivated next year. *Shakarkand* or sweet potatoes were also tried in the Kujong estate with fair success. Naini Tal potatoes were experimented with in the Madhupur estate, but the result was not satisfactory owing to late sowing.

Puri—Government estate.—An agricultural farm on a small scale has been established at Khurda, and experiments were made in this farm with the Naini Tal potato, English vegetables, wheat and tobacco. The results of the cultivation of potatoes, English vegetables and tobacco were most satisfactory. *Casuarina* seedlings and English vegetables were tried in the Balukland estate of Puri town, but its sandy soil proved unfavourable to the latter. An experiment in growing *Marram* grass from roots received from Australia was made in Puri, but the roots were dry on receipt and the experiment failed. Further action is now being taken to try and grow this grass from seed.

Angul.—The Naini Tal potato, wheat and tobacco were the subjects of unsuccessful experiment in some of the khas mahals.

Chota Nagpur Division.

56. *Hazaribagh—Dhanwar Ward's estate.*—Seventy maunds of Naini Tal potatoes were distributed among 359 raiyats in different parts of the estate, and a small quantity was sown in the Pachamba and Dhanwar gardens. The total area cultivated with these seed-potatoes was 14 bighas, and the total yield was 350 maunds, or at 25 maunds per bigha, which cannot be considered to be a very good yield, although about 25 per cent. of the harvested potatoes are reported to be two or three times as large as the seed-potatoes used. The manures used were cowdung and ashes, and the crop was irrigated 9 or 10 times. The Commissioner remarks that the result is very hypothetical, and that the experiment has not been so conclusive as might have been wished, as no account

showing cost of labour, etc., was kept. The Manager of the estate has been asked by the Commissioner to pay closer attention to such experiments in future.

Lohardaga—Encumbered estates.—Naini Tal potatoes were also grown experimentally in 10 encumbered estates in Lohardaga. The result is reported to be fair. Cabbages and cauliflowers were also tried, but the result was not satisfactory. The failure is attributed to the fields not having been properly prepared, though detailed instructions were given long before the seeds were supplied.

Fodder and Silo experiments at Ranchi.—Mr. Cooke, Manager of a tea garden at Palandu, near Ranchi, continued his experiments with fodder grasses and silos. He gave roots of Guinea grass to the Ranchi Jail and to some private persons for experimental cultivation. He reports that the result of his silo experiments has shown that fodder can be preserved in good brick silos with covers, but not in sheds built on the ground. He will make another small *pucka* silo this year. Mr. Cooke's experiments, which are of much value, have convinced him that fodder can be economically and usefully preserved in Ranchi.

Experiments made by the Agri-Horticultural Society of India.

57. The following report has been received from the Secretary to the Agri-Horticultural Society on the fruit-garden maintained by the Society and on the experiments made during the year under report with fodder, fibres, etc. :—

The fruit-garden.

Propagation was fairly extensive last year, except in the case of mangoes. These trees have grown very tall, and as all the lower branches were cut off a number of years ago, *machans* 10 to 20 feet high had to be erected for the purpose of taking grafts.

Anona cherimolia—The cherimoyer.—The two plants made wonderful growth during the year, but defied all attempts at propagation. Plants sent to Assam and Duars are reported as thriving.

Amygdalus persica—Peach.—A large number of new varieties were imported and planted out last January. The majority have grown strongly, and several will be propagated this year. It is intended to lay out a new peach grove during the rains.

Ananasa sativa—Pineapple.—Several plants of the variety known as "Giant Kew" were imported along with other kinds. All have been planted out for stock. Special attention will be given to these throughout the next year.

Bonca burmanica—The Marian.—All but one specimen perished during the cold weather. I have arranged for the importation of large plants, and attempts will be made to graft on mango stocks again.

Citrus.—The Society has now an excellent collection of orange, pomelo, limes, citrons and lemons. It is proposed to propagate each kind heavily, with a view of extending the cultivation of these fruits, both at the nursery and in the gardens. At Alipur, ground is being prepared sufficient to plant out 200 young trees during the rains, and a smaller number at the nursery. None of the trees, except pomelos and citrons, have yet fruited, hence no descriptions are available, but all have been obtained from reliable sources.

Diospyros kaki—Japanese date plum.—The demand for this fruit tree has been very heavy indeed, many tea gardens having taken up the planting of this delicious fruit in earnest. I can vouch for the fruit, having tasted a number grown in Simla and sent me by the Revd. J. Smith. Arrangements have been made to import the best kinds from Japan at the proper season.

Mangifera indica—Mango.—A few choice varieties were added to the garden stock, but I fear will not be ready for propagation for at least a couple of years. A new mango grove consisting of 58 varieties, or 174 grafts of the best kinds, has been planted out on the site of the old Canna beds, near the south boundary, for propagating purposes.

Plantains.—A few new varieties were planted out last year, but have as yet made little growth.

Little growth has been made by the one variety of fig, "Green Turkey," in the gardens. A few figs were collected after the rains. Thirteen varieties of *Ficus carica* have recently been added to the garden stock. So far we have found it difficult to propagate the fig here.

The two specimens of pear trees "Kieffer" and "Le Conte," planted out in 1896, do not appear to have made much growth.

Twelve varieties of vines have been planted at the nursery recently; if possible, they will be propagated during the next season.

Rubus tribalvis—American dewberry.—A small crop of fruit has set on a specimen plant growing in a large pot, but none of the berries are yet ripe. Mr. Helps, of Jalpaiguri, reports success with his plants.

As there is now little space available for planting out, not much more can be done for the present in adding desirable kinds of fruit-trees to our stock, either at the gardens or at the nursery.

Experiments.

During the past year, a considerable quantity of seed was distributed for experimental purposes, including Reana, Lucerne, Japan clover, paddy, maize (American and acclimatised). Lucerne and Reana have now taken a firm hold on agriculturists, and large orders are regularly received for seed. Japan clover has not proved a success in Lower Bengal, but appears to have done well on higher land. At Lucknow, I learn that it yielded 95 maunds green to the acre. Some excellent samples of maize cobs, raised from both imported and acclimatised American seed, were received from all parts of the country, the acclimatised seed specially producing good crops. Fifteen varieties of Ceylon paddy were distributed, but reports have not yet been received. Babu Jogendra Nath Mitra, of Ajhapur, Burdwan, submits excellent samples of Ceylon paddy, the grains being as bold as the original seed. Seven lots were sent him, two being autumn, three winter, and two spring varieties As no instructions were received in regard to planting, all were sown at the same time, and it was not till the plants were in ear that the difference was discovered; consequently the spring varieties suffered for want of adequate arrangements. The experiments with Carolina paddy were not successful, the crop produced being inferior to the original seed, owing probably to want of proper cultivation. In passing, I would like to say that the distribution of experimental plants and seeds presents many difficulties. I will mention but two—first, carelessness in keeping the seed and planting out at the right time, and second, unwillingness to experiment with economic plants, while new and rare fruit and ornamental plants are gladly accepted.

Experiments conducted with Ceara and Para rubber trees during the past five years have been a failure. Each winter, a number of young trees have perished, and now there is but one specimen of the Ceara rubber left in the gardens. Very little success appears to have attended trials in South India. A plot of ground was put under *Cyperus esculentus* (*Chufas*) at the gardens, and a similar bed at the nursery was planted with *C. bulbosus* (*Kaserū*), but neither appear to have done at all well, owing probably to the fact that the beds were not damp enough. Reports from others to whom tubers of *C. esculentus* were sent have not yet been received, though one and all find that rats and squirrels did considerable damage to the beds.

A small bed was sown with seeds of the *Cow pea* (*Vigna catiang*, var.) in April, but did not thrive. A further sowing was made early in June, and yielded a large quantity of excellent fodder for cattle, at a season of the year, however, when abundance of forage was available. The pods formed a good substitute for beans. The demand for seeds and roots of *Rhea* has fallen off considerably; the quotations for seeds ranged from Rs. 30 to Rs. 75 per pound, while roots and cuttings changed hands at figures varying from Rs. 45 to Rs. 80 per thousand. No information as to export of fibre is available, though an offer of £11 to £11 10*s.* per ton was made by the Secretary to the Rhea Fibre Treatment Co., Limited, London, for the bark, simply stripped from the stems and dried. All things considered, it is not likely that Rhea will ever be exported or cultivated on an extensive scale; the Manchester cotton firms would no doubt prevent this. Moreover the results of experiments hitherto conducted prove that in the aggregate, immense sums of money have been lost in attempting to cultivate this plant. Rhea is a plant that will grow anywhere, but to prove financially successful, the land on which it is grown must be richly manured and in a suitable climate.

Curculigo recurvata.—A few experiments were carried on during the year to ascertain the quality of fibre yielded by the petioles of this plant, but to date little success has attended these attempts. In Borneo, the Dyaks use the fibre for ropes. The plant grows well in Lower Bengal.

During the past year, there has been a heavy run on coffee, cardamom, *Ficus elastica* and tobacco seeds. All the coffee plants at the gardens produced fair crops. Cardamom seeds did not come up well, while a few roots planted out under shade died. The usual varieties of tobacco seed were again sent out, but beyond the results reported in the Proceedings and Journal for October—December 1897, no other reports are to hand. At the nursery, a trial was made with a few seeds of each kind, and success appears to have attended the experiment as regards the crop, but the quality has not yet been reported. The demand for agricultural seeds, potatoes, &c., fell far below last year's in quantity, in consequence no doubt of the late famine and the heavy losses caused by the earthquake.

Jadoo fibre.—Having experimented with this material for about three years, I think I may now submit a final report on the experiments:—

(1) *Raising seedlings.*—Little success has been experienced in raising seedlings of annuals or tender plants, either in the Society's gardens or elsewhere in this country, as far as I can learn; but considerable success has attended the sowing of large seeds with hard or tough skins, such as tea, coffee, palms, &c., when it was found that seed germinated in about half the time if sown in *jadoo*, or *jadoo* and earth, than if sown in the ordinary manner.

(2) *Potted plants.*—So far, experiments in this line have not proved successful. The plants treated with *jadoo*, in pots, were chiefly *croton*, *caladium*, *Dracœna*, tea, coffee, *loquat*, *lichi*, *eucharis*, *amaryllis*, rose, mango, peach, *ixora*, *hibiscus*, palm and the *citrus* tribe. I do not find that the plants treated with this material have done any better than those potted in the proper composts. None of the flowering plants produced a single flower, nor did the ornamental foliage plants sport better coloured leaves. Orchids, however, were an

exception, but only so when great care had been taken in potting them with alternate pieces of *jadoo* and crocks or broken bricks, and special attention had been given to watering.

(3) *Plants bedded out.*—A certain number of mango, *lichi*, orange, *pomelo*, *hibiscus*, *ixora* and other plants were bedded out, with a quantity of *jadoo* below the roots and some on the surface. These were found to stand the drought of the hot-weather much better than others planted in the ordinary way, and required on the whole half the quantity of water, but after a while the plants became stationary and required manuring to develop growth.

(4) *Mulching.*—At the gardens, various plants and trees were "mulched" at the commencement of the hot-weather, and withstood the drought in a satisfactory manner. I learn this has not been the experience of others, owing probably to the fact that when *jadoo* was applied to the roots of plants and trees, it was not covered up with leaves or leaf-mould to prevent evaporation. If this is tried, I think success will attend these attempts, but with *jadoo* at Rs. 7 per cwt. *ex* godown, it will prove a comparatively expensive item, unless the plants are valuable.

(5) *Propagation by cuttings.*—When *jadoo* is used for raising cuttings of the orange tribe, *crotons*, hibiscus, &c., it has been found that an equal quantity of sand should be mixed with it, and that fully half the pot or box should consist of drainage; moreover, great care must be taken in the matter of watering the pots and protecting them from the rain during heavy showers. All the *Ficus* tribe, with the exception of *F. Carica* (edible fig) and *F. Roxburghii*, readily rooted in the above mixture. Thousands of *F. elastica* plants could be raised from cuttings in a limited space within a month.

(6) *Propagation by layers.*—This experiment proved successful especially where *croton*, *lichi*, orange, lime and such like plants were tried, but the *jadoo* was mixed with half as much sand. Orange and lime branches, accidentally resting on the surface of some of the pots, also threw out roots.

(7) *Propagation by "Gootee" or China layer.*—This method of propagation has from the commencement proved the most successful (*vide* pages 439—441, Proceedings and Journal, July—September 1896, Report for 1896, pages 638—640, in the Proceedings and Journal fos January to March 1897). Instead of using coir-fibre for securing the *jadoo* to the brancher of plants to be propagated, as in the past, a portion of the "gooties" were treated with *jadoo* and "Hessian" cloth, and pieces of old jute bags were used to wrap the material in. It was found that roots were emitted much earlier and in greater profusion where this was done than where the coir-fibre was used. Orange, lime, and pomelo branches six feet in length were cut in a month, while branches of the *Ficus* tribe (except *F. Carica* and *F. Roxburghii*) measuring up to fifteen feet were taken off thoroughly rooted from the trees in a similar period. According to the reports of the Jadoo Co., Ld., this material has been most successfully used on the vine plantations in the south of France. A very large number of references were received as to the cost of *jadoo-fibre* and its uses. The Calcutta agents are Messrs. Octavius Steel & Co.

The thanks of this Department are due to the Secretary of the Agri-Horticultural Society for the cordial co-operation and ready aid which he has rendered on several occasions during the year.

Trial of improved Agricultural implements in Wards', Government, and private estates.

58. The implements distributed to different persons during the year under report were 9 Sibpur ploughs, 10 Sibpur hoes, and 25 Baldeo ploughs. The Sibpur plough has been found useful in light soils, but in heavy soils the draught is generally reported to be too much for country bullocks. The price of the Baldeo plough (Rs. 7) is considered high. It was appreciated by the raiyats of Mainaguri in Jalpaiguri, but the opinion in the Alipur tahsil of the same district was that it was too heavy for the local cattle. The Sibpur hoes, which were distributed among the jotedars of Jalpaiguri, did not find much favour with them. They are also said to be too highly priced.

The above paragraph shows that we have been able to do little to induce cultivators in Bengal to adopt the implements we have recommended to their notice. This has been in many cases the fault of the implements, and I doubt if we have yet succeeded in finding a plough better suited to the requirements of Bengal than those that are already in use, although those ploughs seem to be in many cases wasteful of time and labour. Mr. N. G. Mukherji has recently reported on various improved implements found by him in successful use in Madras and the Central Provinces, and experiments will be made with them in the current year.

Supply of seeds, manures, and implements.

59. A list of seeds, implements, manures, etc., distributed by the Department during the year 1897-98 (exclusive of those used in experimental farms) is given in Appendix II.

Crop-cutting experiments by District Officers and Settlement Officers.

60. A report on the results of crop-cutting experiments for the three years 1894-95, 1895-96, and 1896-97 was submitted to Government with this office letter No. 356A, dated 3rd March 1898. The results obtained up to date do not appear to be sufficiently reliable to afford final estimates of outturn. With a view to obtain more accurate information, revised rules were framed by my predecessor for the conduct of experimental crop-cuttings in these Provinces, and were circulated to all District Officers with my letter No. 18A., dated 7th April 1898. This important subject is being carefully kept in view, and attention is being concentrated on the rice crops, which are of more practical importance to the Province than any other crops. The returns for 1897-98 are now being received and compiled in my office.

Crop-cuttings in Jail gardens.

61. A report on the result of 24 crop-cuttings made in Jail gardens during 1896-97 was submitted to Government with this Department's letter No. 1648, dated 18th September 1897. The falling off in the number of cuttings was due to some extent to the unfavourable character of the season. Returns of crop-cuttings made in Jail gardens during 1897-98 have recently been received and are being compiled. A report on the result of these cuttings will be submitted separately to Government in due course.

Locusts and other insect pests.

(*1*)—*Locusts.*

62. Reports on the appearance of locusts were not received from all the Divisions of these Provinces during the year 1896-97, and no mention of this subject was therefore made in the Annual Report for the year ending 31st March 1897. A summary of the local reports for the two years 1896-97 and 1897-98 is given below:—

63. *Burdwan Division.*—Flights of locusts were observed in many parts of this Division in October and November 1896, and again in October, November and December 1897. They occasionally alighted and did some damage to standing crops of peas, potatoes and mustard, but as a rule they left the paddy crop alone.

64. *Presidency Division.*—In November 1896, flights of locusts were observed in some parts of the 24-Parganas, Nadia, Murshidabad and Khulna. On the 2nd of that month, they alighted and did considerable damage to the gram and *arhar* crops in the Meherpur subdivision of the Nadia district, and during the following few days similar flights did some damage to crops in the 24-Parganas and in the Khulna district. In December 1897, these districts, with Jessore and Nadia, suffered here and there from the ravages of a flight of locusts, but they appear to have remained in the Division for a few days only.

65. *Rajshahi Division.*—Flights of locusts were observed during the year 1896-97 in Rangpur and Dinajpur and in the Native State of Sikkim, but no damage is reported to have been done in any of these localities. The Manager of the Maldwar estate in Dinajpur reports that in the Purnea portion of the estate, considerable damage was done by locusts last August to the standing *bhadoi* crops. Flights of locusts were also observed during the year 1897-98 in the districts of Jalpaiguri and Pabna. No damage to any crop was done in Jalpaiguri. In the Sirajganj subdivision of the Pabna district, damage was done to peas and *china* to the extent of 2 annas.

66. *Dacca Division.*—During the year 1896-97, a flight of locusts was observed in the Narainganj subdivision of Dacca, but it passed off without doing any harm. During the year 1897-98, flights of locusts were observed in parts of the districts of Dacca, Faridpur, and Backerganj. They did a little damage in Backerganj.

67. *Chittagong Division.*—In December 1897, flights of locusts were observed in the districts of Noakhali and Tippera. They caused slight damage to chillies, pulses and mustard, etc. In Tippera, they were also observed in January 1898, passing from west to east of Daudkandi thana.

68. *Bhagalpur Division.*—From this Division, some damage by locusts was reported in October and November 1896, and again in May, July, November and December 1897. In all cases, the flights appear to have been small ones, and the crops were only slightly affected.

69. *Patna Division.*—Locusts were observed in Gaya, Champaran, and Muzaffarpur in the rainy season of 1896-97, but they did no damage. In October 1896, they were observed in Shahabad, where they alighted at Arrah, Dumraon, Buxar and Bhabhua, and did some damage to *bhadoi* and *rabi* crops. In the cold weather, they appeared in the district of Patna, where they alighted at Punpun, in the Sadar subdivision, and also in a few villages in the Bihar subdivision, doing some damage to *rabi* seedlings. The amount of damage done was insignificant, and second sowings were resorted to in every case where the seedlings were devoured. They were also seen in various places in the district of Saran. During the rainy season of 1897, flights of locusts were observed in the Barh and Sadar subdivisions of the districts of Patna, in the Sadar subdivision of Saran, and in several thanas in Shahabad, but they did little or no damage. They were again observed in January 1898 in those parts of Patna slightly damaging the crops in Fatua and Mokameh, and in February 1898 in some parts of thana Gopalganj in Saran, where they damaged *arhar* to some extent. Again, on the 15th and 16th November, they were observed in some villages of the Rajapur outpost in Shahabad coming from the south and passing off northwards. During the year 1897-98, flights of locusts were also observed in the Aurangaad subdivision of the district of Gaya and in a few villages of the Sitamarhi and Hajipur subdivisions of the district of Muzaffarpur, but they did no damage.

70. *Chota Nagpur Division.*—In the early part of October 1896, flights of locusts were observed in Palamau, but they did little injury. Later on in October they appeared in Hazaribagh, where also they did no appreciable harm. In Manbhum, however, serious injury to *til* (Sesamum indicum), *surguja*, wheat, barley, and other *rabi* crops was reported from one of the outposts. During the year 1897-98, a flight of locusts appeared in the district of Hazaribagh, but it did no appreciable damage.

In Palamau, flights of locusts were observed during 1897-98 on four different occasions. The first flight, which was observed on the 12th, 14th and 15th of June 1897, and the fourth flight, which was observed on the 16th February 1898, did little or no injury to the crops. The second flight, however, which appeared between the 12th and 29th of November 1897, and the third flight, which appeared on the 7th December 1897, did considerable injury to the crops.

In the district of Manbhum also, flights of locusts appeared during the year, first in June 1897 in thana Purulia and again in July in thanas Gobindpur, Tundi and Nirsha and the Chikanda outpost. They are reported to have done considerable damage in thanas Gobindpur and Nirsha to the young *mung* and *kodo* crops, and some to *makai*, *marwa* and *arhar*.

(2) *Other Insect pests.*

71. The information regarding insect pests of other kinds that did more or less damage throughout these Provinces is not sufficiently definite, except in two instances, for the purposes of identification. Officers reporting to the Director of the Department of Land Records and Agriculture on damage done to crops by insects which they are unable to identify accurately should endeavour, if possible, to send specimens of the insects to this office for examination and identification. Of the insect pests that did any considerable damage last year in these Provinces, it may be said definitely that *Leptocorisa acuta, Thumb.* (*vide* Indian Museum Notes, Volume I, pages 1-3 and page 205, and Volume II, page 35), did considerable damage to paddy in several districts, and that a hemopterous insect, belonging to the *Jassidae* family, did some damage to the paddy crop in the Bhola subdivision of Backergunge. Specimens were sent in these two instances, and they were identified by the Superintendent of the Indian Museum.

On receipt of a report from the Subdivisional Officer of Ghattal, which was forwarded to this office by the Collector of Midnapore, of the outbreak of a plague of grasshoppers in the Chandrakona thana, Mr. N. G. Mukherji

was deputed to Midnapur last November to make a special enquiry into the matter. His report showed that the plague was more serious than had been originally reported. He learnt that grasshoppers had also done considerable damage to crops in Chaibassa, but was of opinion that the insects were not of a migratory character. Their development was probably due to the drought of the previous two years. As a preventive measure, Mr. Mukherji suggested the constant stirring of the soil till the rains set in. His suggestions and report were forwarded to the District Officers of Midnapur and Singbhum for favour of a further report as to the damage done, and for any action they considered it desirable to take. Mr. Mukherji's suggestions have been circulated among the raiyats by the Collector of Midnapur.

Sericulture.

72. Messrs. B. C. Basu and N. G. Mukherji were in charge of this branch of the work of the Department from the beginning of the year till the 1st of March 1898, when Mr. N. N. Banerjei, Assistant Director, took over charge.

73. The seed-rearing nurseries, where silkworms were reared on scientific principles during the year under report, were as follows:—

(1) Chaltia, Balia, Kandapara, and Surjabati in Murshidabad;
(2) Duna and Narainghati in Birbhum;
(3) Kagachira, Araidanga, Jot, Birampur, and Mehdipur in Malda;
(4) Noadapara, Bhalukgachi, and Rampur Boalia in Rajshahi; and
(5) Nipina in Midnapur.

Chaltia was the only nursery carried on entirely at Government expense. Three new nurseries were opened during the year, viz., at Surjabati, Narainghati, and Rampur Boalia, in accordance with the scheme approved in Government orders No. 873T.R.—Agri., dated 7th October 1896. The object kept in view in the opening of these seed-rearing stations is to encourage private enterprise among the cocoon-rearers, and the plan followed is to allow the rearers the use of microscopes and other special appliances not ordinarily available in villages, as long as they can satisfy the Department that they are working under the scientific methods advocated by us. The nurseries at Surjabati (in Murshidabad) and at Narainghati (in Birbhum) belong to private rearers; that at Rampur Boalia is attached to the Industrial School, which was established under the auspices of the District Board of Rajshahi to give an impetus to the silk and other industries of the district. Since the close of the year an important development of this work has taken place, the chief firms interested in silk in Bengal having combined and subscribed largely to carry out a similar scheme on a more extensive scale. It is now proposed to amalgamate the two schemes under a joint-committee at Murshidabad and to press the adoption of the improved methods of rearing introduced in Europe by M. Pasteur. There is ample evidence that the rearers are beginning to learn from the success attained in the demonstration nurseries, and that many of them are willing not only to adopt the improved system of rearing, but to buy out of their own funds the microscopes and other appliances necessary. A separate report will shortly be submitted to Government on this subject.

The total quantity of cocoons raised during the year in the seed nurseries under the supervision of this Department, so far as information has been supplied to this office, amounted to 10,914 kahans, against 7,329 kahans raised in 1896-97, and 6,451 kahans raised in 1895-96. Out of this amount, 2,843 kahans of cocoons (equivalent to about 8,500 ounces of eggs) were sold for seed, against 1,056 kahans of cocoons (*i.e.*, 3,200 ounces of eggs) sold for seed in 1896-97, and 1,331 kahans of cocoons (4,000 ounces of eggs) sold for seed in 1895-96. There was thus a distinct advance in the sale of seed, which is the criterion of success.

The Industrial School at Rajshahi was started last January. At present sericulture alone, both practical and theoretical, is taught in the school, but if it proves successful, it is proposed that other technical subjects, such as smith-work, carpentry, etc., should be added hereafter. The school is subsidized by this Department, half the pay of the teacher in charge, who is one of the Sericultural Overseers of the Department, being met by Government. A good model rearing-house and a mulberry plantation are attached to the school. At present there are 15 students on the attendance roll, most of whom are in

some way connected with the silk industry. Mr. N. N. Banerjei, Assistant Director, who inspected the school in June last, reports favourably on its working.

It is hoped that the English version of Mr. N. G. Mukherji's Manual of Sericulture, which has been already privately published in the vernacular, will shortly be ready for publication. With the permission of the Collector of Murshidabad, Mr. Mukherji distributed 730 copies of the Bengali Manual to the schools of that district.

Arboriculture.

74. *Date-palms.*—The results hitherto attained in the experimental cultivation of date-palms in the Chota Nagpur Division have been of doubtful value. The growth of the five Arabian date-palms in Hazaribagh is very slow, their average height being five feet, and the circumference of the stems just above ground level thirty inches. The Tunisian date-palms are reported not to thrive well in Hazaribagh. The date-palms planted in the gardens of the Bishop of Chota Nagpur and Mr. R. C. Roy, Barrister-at-Law, and in the German Mission compound at Ranchi, are reported to be healthy, but their growth is very slow. Six of the eight date-palms still living in the estate of the Maharaja Bahadur of Sirguja, a Tributary State in Chota Nagpur, are reported to be healthy and to grow well. The date-palms planted in the estate of Kumar Jagat Mohan Nath Sahi Deo of Ratu in Lohardaga were destroyed by white-ants. The date-palms experimentally grown in the tributary states of the Rajas of Udaipur, Gangpur, Jashpur and Seraikela in Chota Nagpur are reported to grow well and steadily. The date-palms that were planted in the estates of the Thakur of Kharsawan and the Raja of Bonai are reported to have died during the year. There are also some plants in the estate of Bai Deo Kweri of Koirea in Chota Nagpur, which are said to be properly cared for.

Eucalyptus tree (*Eucalyptus Globulus*).—The Deputy Commissioner of Hazaribagh reports that the result of the experimental cultivation of *Euclyaptus* trees in the district is very satisfactory. Over one hundred trees which were planted some 10 years ago are said to be thriving well, their average height being about a hundred feet, and the average circumference of the trunks at a height one foot and six feet above ground level being 5′ and 4¼′ respectively. The plants raised from the seeds of the old trees are also doing very well.

Divi-Divi trees (*Cæsalpinia Coriara*).—The Deputy Conservator of Forests of the Sonthal Parganas Division reports that 35 trees at Katikund and 16 at Jhilimili are growing well. During the year under report, about two seers of seed were sown in beds at Katikund, and of the 151 plants raised, one hundred are still living and doing well.

CHAPTER VI.

AGRICULTURAL EDUCATION.

75. The final sanction of Her Majesty's Secretary of State for India to the formation of agricultural classes at Sibpur was received during the year, and it was decided to open the classes from June 1898. The scheme of agricultural education has also been determined, and the details were given in the Bengal Government Resolution No. 1141, dated 15th March 1898, on the subject. The agricultural classes were actually opened in July 1898.

76. *Bengal Veterinary School.*—An account of the working of the Bengal Veterinary Institution at Belgachia has been separately submitted to Government.

CHAPTER VII.

Publication of Agricultural Information.

77. The following forecasts of harvests, special reports of crops, agricultural statistics and other agricultural reports, were prepared and published by this Department during the year under report :—

(1) Forecast of the outturn of *rabi* food-crops of 1896-97.
(2) Report on the outturn of all rabi crops of 1896-97.
(3) Preliminary and final reports of the jute crop of 1897.
(4) Preliminary and final reports of the *bhadoi* crops of 1897.
(5) Preliminary and final estimates of the winter rice crops of 1897.

(6) Report on the early and late cotton crops of 1897-98.
(7) Preliminary and final reports of the indigo crops of 1897.
(8) A final estimate of the wheat crop of 1896-97, and a first forecast of the outturn of the wheat crop of 1897-98.
(9) A final forecast of the oil seed crops of 1896-97, and a first forecast of the oil-seed crops of 1897-98.
(10) Tables of agricultural statistics for 1896-97.
(11) A consolidated table showing the average wholesale prices of food-grains, fire-wood, etc., in the principal marts of Bengal for the year 1896-97.
(12) A list of agricultural implements and machines which were tested during the year 1897, and of those in use which were reported to have met with more or less marked success during the year.

Copies of the crop forecasts and agricultural statistics were printed and distributed as in the previous year.

The following were also prepared during the year:—

(1) Bulletin No. 4 of 1898. Note on the mustards cultivated in Bengal, by Surgeon-Major D. Prain.
(2) Monograph on the cotton fabrics of Bengal, by Mr. N. N. Banerjei, Assistant Director.

CHAPTER VIII.

FINAL.

Emigration to Burma.

78. The Managing Agents of the British India Steam Navigation Company report that during the year 363 persons were conveyed by their steamers as State emigrants to Burma, against 241 conveyed in the year 1896-97. Of these, 276 were adults, 53 children, and 34 infants. The total subsidy the Government paid for the conveyance of these State emigrants was Rs. 756-4. The comparative failure of this emigration scheme has been the subject of a special report in the course of the year.

Agricultural Exhibitions.

79. During the year under report agricultural exhibitions were held at Suri in Birbhum, at Madhupur on the East Indian Railway line, at Kalimpong in Darjeeling, at Alipur and Falakata in Jalpaiguri, at Bera in Pabna, at Barhampur in Shahabad, at Sonepur in Saran, at Tintanga in Bhagalpur, and at Sitamarhi in Muzaffarpur. Of these, the exhibitions noted in the margin received Government subsidies. A brief account of each of these exhibitions is given below. Further details concerning them will be found in the Annual Report of the Civil Veterinary Department, and in the separate reports on the fairs which have already been submitted to Government.

	Rs.
Kalimpong ...	... 500
Alipur and Falakata	... 500
Sonepur ...	... 125
Barhampur ...	... 150

80. *Suri Cattle Fair.*—This fair was held for the second time, from the 4th to the 8th of February 1898. The fair was at first started with a view to improve the quality of the cattle in the district of Birbhum, which is very poor, but this year poultry and agricultural produce were also exhibited. Veterinary-Captain Raymond, Superintendent, Civil Veterinary Department, Bengal, was present at the fair. The exhibits were generally fewer and poorer in quality than in the previous year, and there was some diminution in the interest shown by the cultivators in the fair, though the gentry of the district subscribed liberally for prizes. His Honour Sir Alexander Mackenzie, the late Lieutenant-Governor of Bengal, who happened to be at Suri at that time, presided at the distribution of certificates and prizes.

81. *Madhupur Exhibition.*—This exhibition was held at Madhupur, in the Sonthal Parganas, on the East Indian Railway line, on the 12th and 13th February 1898, under the management of the President and Members of the Cossipore Practical Institution of Agriculture, Floriculture, and Horticulture. This being the second year only of the exhibition at Madhupur, the agricultural exhibits were few. They consisted of cereals, oilseeds, cotton, *jowar*, *ghi*, butter, ploughs, baskets, bullocks, cows, ponies, sheep and goats. The exhibition is mainly, however, one for flowers and fruit, and has not yet been developed on the

agricultural side. As the Manager has declared himself anxious to make the show a more practical one, it is hoped that the agricultural exhibits will be more numerous and more valuable in the present year. The Sonthals evinced great interest in the different exhibits shown. Mr. N. N. Banerjei, Assistant Director of Land Records and Agriculture, attended the show.

82. *Kalimpong Fair.*—The fair at Kalimpong in the district of Darjeeling was held in November last. Veterinary-Captain Raymond, who attended the fair, reports that the number of Bhutia ponies exhibited was larger than last year, and that their quality was above the average. The other ponies showed little improvement, and the donkeys that were shown were bad specimens. The number of mules present at the fair equalled that of last year and their quality was decidedly better. Out of the Government subsidy of Rs. 500, the sum of Rs. 465 was awarded in prizes for mules. The number of cattle shown at the fair was greater than last year, and they were, on the whole, of good quality.

83. *Alipur and Falakata Fairs.*—The fair at Alipur lasted from the 10th to the 26th January 1898. The value of the sales in this fair was estimated at Rs. 5,000 in the year under report, against Rs. 3,500 in the preceding year. The increase is due to the better harvests of the year. The Falakata Fair lasted from the 26th January till the 14th of February 1898. There were fewer shops in this fair than in the previous year, but there was no appreciable increase or decrease in the business of the fair. No agricultural exhibits were brought in, although a fair amount was offered in prizes for such exhibits. The main object of these fairs is to promote and encourage trade with Bhutan.

84. *Horse and Cattle Fair near Bera in Pabna.*—At the end of December 1897, a horse and cattle fair was started here for the first time by local traders, under the presidency of the District Magistrate. For various reasons the fair was not successful, but the District Magistrate, Mr. C. A. Radice, is of opinion that a good beginning has been made and hopes for better success next year.

85. *Barhampur Agricultural Show.*—This show was held during the *Falguni mela* on the 18th and 19th February 1898. It was divided, as in previous years, into four sections, comprising exhibits of cattle, agricultural produce, agricultural implements, and vegetables, fruit and flowers. The show was attended by Veterinary-Captain Raymond, who reports that 16,280 cattle, 482 horses, and 1,938 ponies and buffaloes were present at it. There were fewer cattle than in the previous year. He remarks that the cattle were of average quality, and the horses were as bad as in the previous years. The ponies up to 13 hands were not very bad, but few of them were sturdy enough for Army transport work. The buffaloes were good.

In the agricultural section, there was some falling-off in the number and quality of the exhibits at the show this year, and the cultivators did not appear to take so much interest in it as in former years. I am in communication with the local officers with a view to ascertain what can be done to increase the value of the show, and to rouse the interest of the cultivating classes in it.

86. *Sonepur Fair.*—The Sonepur Fair was held from the 6th to the 11th November 1897. Veterinary-Captain Raymond, who visited the Fair, reports that the approximate number of animals brought in was 2,000 to 3,000 horses and ponies, 35,000 to 38,000 bullocks, 800 cows, 150 buffaloes, 600 to 700 elephants, and 5 or 6 camels. There were fewer horses, but more ponies this year. Captain Raymond is of opinion that the horses were rather better in quality, and that the points of the ponies showed improvement. A number of small sturdy hill ponies were also on show. The cattle brought to the show were distinctly below last year's exhibits in quality, though more numerous on the chief day of the fair. The draught-cattle were not nearly as good as last year. Thecows and cow-buffaloes were much more numerous than last year. The cows were mostly of the Patna breed. The cow-buffaloes were good. The elephants were more numerous than last year, and there were several fine tuskers among them. Twelve country-bred horses were purchased at the fair for the 2nd Bengal Cavalry, and the purchasing officer of the Central India Horse also bought some. Major Pollock, 7th B. L., purchased some hill ponies for the Commissariat Department. The show appeared to Veterinary-Captain Raymond to have made progress, and he reports that its management showed an improvement over that of last year. Prizes were awarded for cattle only.

87. *Tintanga Agricultural Show.*—This show was held from 6th to 8th February 1898 at Diara Tintanga, a Government khas mahal in the district of Bhagalpur. Prizes were given for agricultural exhibits. Owing to heavy rain, there was a falling-off in exhibits this year and no cattle were brought to it. A few machines and agricultural implements were exhibited by this Department.

88. *Sitamarhi Cattle Fair.*—The Sitamarhi fair in the district of Muzaffarpur was held in April 1897, under the auspices of the "Cattle Improvement Club." Veterinary-Captain Raymond, who attended the fair, reports that the number of cattle shown at the fair was smaller than in the previous year. The average quality of the animals was very good, but Veterinary-Captain Raymond considers that the animals shown at Sonepur were better than those at Sitamarhi. A few buffaloes and goats were present at the show, but there were no sheep, horses or ponies for sale. The bull-buffaloes were good and the cow-buffaloes fair. The big draught pairs of cattle shown this year were not so good as those shown in the previous year, but the medium-sized pairs and some of the single bullocks were good. A sum of Rs. 385 was awarded in prizes.

Applications for patents for inventions.

89. Thirteen applications for patents of an agricultural character were received during the year under report from the Government of India, in the Revenue and Agricultural Department, for opinion. Seven of these applications were for patents connected with the extraction and treatment of fibres; two were for colouring jute fibre; two for cleaning cotton; one for a domestic loom; and one for a *chira*-making apparatus. The applications were sent to the Secretary to the Agri-Horticultural Society of India, who obtained the opinions thereon of Mr. H. J. K. Green, Member of the Institute of Civil Engineers, and of Mr. W. R. Criper, Analytical Chemist.

Cost of miscellaneous Experiments and Enquiries.

90. Excluding the cost of the experimental work done in combating silk-worm disease, the cost to Government of agricultural experiments and miscellaneous enquiries conducted under the direct supervision of the Department of Land Records and Agriculture during the year under report was Rs. 8,406-12-7, against Rs. 10,353-15-3 expended in the preceding year. The details are as follows:—

		Rs.	A.	P.	Rs.	A.	P.
1.	Maintenance of the Sibpur Farm				3,159	3	9
2.	Experiments other than those made in experimental farms ...				1,502	8	7
	(*a*) Purchase of seed potatoes	250	8	9			
	(*b*) Ditto Muzaffarnagar seed wheat ...	98	4	0			
	(*c*) Ditto Buxar seed wheat ...	5	12	7			
	(*d*) Lac experiments at Kalimpong ...	200	0	0			
	(*e*) Cowdung experiments	20	15	6			
	(*f*) Purchase of other seeds and manures, &c. ...	688	3	6			
	(*g*) Miscellaneous	238	12	3			
		1,502	8	7			
3.	Pay and travelling allowance of the Agricultural overseers ...				1,182	6	3
4.	Cost of exhibiting implements and machines at the Agricultural Shows				99	15	0
5.	Purchase of implements				333	10	9
6.	Cattle-breeding				106	9	0
7.	Illustrations for the note on mustard				200	0	0
	Ditto ditto on wheat				156	0	0
	Ditto ditto on cotton fabrics				535	0	0
8.	Miscellaneous (including Rs. 200, being the price of furniture and implements for the Sitamarhi Veterinary Dispensary, and Rs. 382-10, the municipal tax for the Sibpur Farm) ...				1,131	7	3
	Total ...				8,406	12	7

Officers of the Department.

91. The Department has suffered a serious loss in the transfer of Mr. Bhupal Chandra Basu to a post on higher pay as Assistant Director of Land Records and Agriculture in Assam. It was, however, impossible for the Department, from want of funds, to offer him adequate promotion within this Province. Mr. Nagendra Nath Banerjei has done consistently good and accurate work throughout the year. Mr. Nitya Gopal Mukherji rendered much assistance to the Department during his short tenure of office, and the diary he has submitted of his recent tour in Madras, the Central Provinces and the North-West Provinces, is full of interesting information.

I have the honour to be,

SIR,

Your most obedient servant,

P. C. LYON,

Director of the Department of Land Records and Agriculture, Bengal.

APPENDIX I.

List of products of which specimens were collected for the Indian Museum, Calcutta, and for the Imperial Institute, London, during the year ending 31st March 1898.

Botanical name of product.	Vernacular name of product.	Parts collected.
1	2	3
Lagenaria vulgaris ...	Kadu	Seeds, pulp, leaves.
Litsaea polyantha ...	Barakukur chita ...	Seeds.
Leucas aspera ...	Chotahalkusa	Leaves.
Luffa acutangula ...	Jhinga	Seeds, oil, dry cake, brush.
Maranta arundinacea ...	Tikhor	Roots, flour.
Mollugo cerviana ...	Ghima sák	Plant.
Livistona speciosa ...	Jhau	Leaves.
E. thymifolia ...	Dudiya	Do.
Euphorbia antiquorum ...	Narasij	Bark.
Pachyrhizus angulatus ...	Sankalu	Seeds.
Michelia champaca ...	Champa	Attar, fruits.
Jasminum sambac ...	Bel	Do., oil.
Mimusops elengi ...	Bakul	Do., fruit.
Luffa var. amara ...	Tito dhundul	Rind.
„ ægyptiaca ...	Dhundul	Oil, cake.
Mangifera indica ...	Am, ambra	Unripe fruit, kernel.
Thevetia neriifolia ...	Kalkiphul	Seed, stones.
Nigella sativa ...	Kalojira	Oil, oil-cake, seed.
Lepidium sativum ...	Halim	Oil, oil-cake.
Nardostachys jatamansi ...	Jatamansi	Root-stock, roots.
Jatropha curcas ...	Bon bheranda	Root-bark, oil.
Morus indica ...	Tunt	Roots, bark.
Lawsonia alba ...	Mendi	Seed.
Feronia elephantum ...	Kath bel	Ripe fruits.
Bombax malabaricum ...	Simul	Seeds, oil, oil-cake.
Leea macrophylla ...	Dholsamudra	Root.
Mirabilis jalapa ...	Krishnakeli	Root, leaves.
Cleome viscosa ...	Hurhuria	Seed.
Ficus roxburghii ...	Doomoor	Fruit.
Ipomœa quamoclit ...	Tarulata	Plant.
Kaemperia rotunda ...	Bhui champa	Do.
Calotropis gigantea ...	Akanda	Root-bark.
Piper betle ...	Pán	Leaves of three varieties.

APPENDIX II.

List of Seeds, Implements, Manures, &c., distributed by the Department, during the year 1897-98.

Seeds.

	Mds.	s.	ch.
Potatoes	365	10	0
Paddy	52	5	0
Muzaffarnagar wheat	20	0	0
Buxar wheat	3	9	0
Peas	1	30	0
Gram	1	10	0
Mung	1	0	0
Lentils	0	35	0
Barley	0	27	0
Oats	0	16	4
Jowar	0	7	8
Marua	0	7	8
Kodo	0	7	8
Bajra	0	7	8
China	0	7	8
Sawan	0	7	8
Tanguni	0	7	8
Maize	0	2	8
Sorghum	0	2	0
Carrot	0	2	6
Lucerne	0	1	4
Reana	0	1	0
Tea	1	0	0
Tobacco	0	0	2
Patal root	0	10	0
Arrowroot	2	20	0

	Kahan.
Sugarcane cuttings	20

	Value. Rs.	a.	p.
English vegetables	31	15	6
Grafts and plants	48	5	0

Implements.

	No.
Sibpur plough	9
,, hoe	10
Baldeo plough	25
Country ,, ...	1

Manures.

	Mds.	s.	ch.
Castor-cake	134	0	0
Gypsum	4	0	0

	Value. Rs.	a.	p.
Chemicals	4	7	0

C. A. P. & others—Reg. No. 1375J—700—30-8-98.

REVENUE DEPARTMENT.

AGRICULTURE.

CALCUTTA, THE 21ST NOVEMBER 1898.

RESOLUTION—No. 3475.

READ—

(1) Letter No. 836A., dated the 3rd September 1898, from the Board of Revenue, Lower Provinces, Land Revenue Department, submitting the report of the Department of Land Records and Agriculture, Bengal, for the year 1897-98.
(2) The report itself.
(3) Read also the Resolution of Government on the report for the year 1896-97.

THE annual report on the working of the Department of Land Records and Agriculture, Bengal, for the year 1897-98, which was due to Government on the 15th August last, was received with the Board's remarks thereon about three weeks after the due date. The report is the second of its kind which has been prepared in the form prescribed by the Government of India in the eighth Resolution of the Revenue and Agricultural Department dated the 20th March 1897 on the proceedings of the Agricultural Conferences of 1893 and of 1895-96. The delay as explained by the Director is due to the difficulties experienced by him in getting the report promptly compiled during his frequent absence on tour.

Mr. W. C. Macpherson, I.C.S., was in charge of the Department from the beginning of the year up to the 23rd June 1897, and again from the 5th September to 22nd November 1897, when he reverted to general duty, and was succeeded by Mr. P. C. Lyon, I.C.S., by whom the present report is submitted. Mr. C. G. H. Allen, I.C.S., officiated as Director during the period from 24th June to 4th September 1897, while Mr. Macpherson was deputed on special duty in connection with the Orissa settlement operations.

2. *Chapter II of the Report.—Land Records Establishment.*—The number of registrations effected during the year under report under the provisions of the Land Records Maintenance Act, III (B.C.) of 1895, in the three mutation offices opened in 1896-97, at Bettiah in Champaran and at Hajipur and Mahnar in Muzaffarpur, are shown below:—

THANA.	Office.	Registration direct under section 6.	Registration through Registrars under Rule 5.	Total.	PERMANENT TENURES.		TEMPORARY TENURES.		HOLDINGS AT FIXED RATES.		OCCUPANCY HOLDINGS.		OTHER HOLDINGS.	
					Transfer.	Succession.	Transfer.	Succession.	Transfer.	Succession.	Transfer.	Succession.	Transfer.	Succession.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Bettiah ...	Bettiah	232	880	1,112	1	Nil.	99	6	8	1	928	9	59	1
Hajipur ...	Hajipur	1,057	1,082	2,139	Nil.	Nil.	Nil.	Nil.	373	139	1,180	288	137	22
	Mahnar	1,991	548	2,539	14	12	2	Nil.	80	53	1,433	788	88	69
	Total ...	3,280	2,510	5,790	15	12	101	6	461	193	3,541	1,085	284	92

In the Resolution upon the report for the preceding year it was observed that while the statistics of transfers recorded showed that the registration of changes under the Act was far from perfect, yet that this had been anticipated, and in various ways the Act had worked as satisfactorily as could have been expected. It was requested that in future years more attempt might be made to analyse the figures reported, both by way of comparison with the results which might reasonably have been expected, and of examination of the nature of the transfers made, while a special report was called for as to the practical difficulties experienced in the working of the Act, with recommendations for their removal. It is now stated that the figures do not admit of detailed

comparison with those shown in the last year's report, which were for a portion of the year only. The most satisfactory results are exhibited by the office at Mahnar, and the least so by that at Bettiah. Financially, the latter office worked at a loss of Rs. 1,021, and that at Hajipur of Rs. 627, while the Mahnar office made a profit of Rs. 753.

3. Figures have been furnished by the Director, comparing the number of mutations, which have been actually registered in the three offices since their opening, with the results which might have been anticipated in the light of independent local enquiries and calculations made from time to time by different officers connected with the working of the Act, and in each case the results fall very far short of the estimated realities. The whole subject is at present receiving the separate attention of Government; the special report called for from the Director has been received, together with the preliminary opinions held by the Board of Revenue on the subject. Certain further enquiries have, however, still to be made, and pending the full consideration of the criticisms advanced against the working of the Act as at present framed, the Lieutenant-Governor refrains from any expression of opinion as to the degree of success which has hitherto attended its operation, or as to the modifications and changes which further experience may suggest.

Outside Bihar, the only other area to which the Land Records Maintenance Act has been so far extended is that of the Sujamutha estate, in the district of Midnapore. It having been found, however, that the settlement records of the estate, which were prepared in 1892, were not altogether accurate, and therefore unfitted for the purpose of serving as an initial register of mutation, the operation of the Act has, with the approval of the Board of Revenue, been suspended in the estate, pending their revision by the Sub-Manager of the Burdwan Raj estate.

4. As requested last year an attempt has been made to analyse in greater detail the figures of mutations recorded elsewhere in those tracts where a system for the maintenance of the records is in force, but it is reported that the figures are still in many instances incomplete, and in several important estates very little improvement has been effected. Comparison between the results attained by the different estates is therefore difficult; the most satisfactory results are found in the Government estates of Backergunge, where transfers were registered affecting 7·32 per cent. of the total tenancies and 22·10 per cent. of the total number of fields; while at the other end of the scale stand the Burdwan Raj Khas Mahals, in which transfers affecting ·16 per cent. of the total tenancies and ·06 of the total number of fields only were recorded, showing clearly, as the Director observes, that the registration of mutations in this case is little better than a farce. The Manager in explanation ascribes the smallness of the number of transfers registered to the absence of the custom of the transfer of raiyati-holdings in the Burdwan Division. This statement is said to be traversed by the Settlement Officer who has been conducting the survey-settlement operations of those mahals, but the grave issue has now been directly raised as to whether the Manager or the Settlement Officer is right, and whether it is expedient to maintain a system that encourages the growth of a doubtful privilege. The Lieutenant-Governor is aware that the Board are giving their immediate attention to the matter and awaits their report. The figures are little better in the estates of Kujang in Cuttack, Sujamutha in Midnapore, and Dakhin Shahbazpur in Backergunge. In the Banki estate in Cuttack only transfers by sales have been recorded. Throughout all these areas the registration of mutations is so patently incomplete as to be altogether useless for any purpose whatever, and the Director must set himself to consider by what means he can soon make it really effective. As matters stand, it seems to be useless. The rules for the maintenance of the records in theAngul Government estate are under revision, and the Director also promises further enquiries as to the alleged difficulties of showing the khasra numbers of fields transferred in the Mynaguri Tahsil in the Western Duars. There was a heavy file of undisposed of applications in the Maldwar estate in Dinajpur; on the subject of the inaccuracy of the returns furnished, the Director explains that the exaction of fees for the record of mutations, originally at very high rates, has probably affected the accuracy of the returns, and their reduction was therefore suggested. The Board consider that the case

of this estate affords a good illustration of the difficulties attending the attainment of any complete system of mutation either by an automatic method, or by management on behalf of the proprietor. They observe:—

"The fees, the exaction of which is believed by the Director to have affected the accuracy of the returns, are found to have been levied by long-standing custom, and to be the right of the proprietor; and the Board have agreed with the Commissioner that in its fiduciary position, the Court of Wards would not be justified in abolishing these fees, which are part of the income of the estate."

No information has been furnished by the Director concerning the registration of mutations in the Khurda Government estate in Puri.

5. *Maintenance of boundary marks.*—Detailed information has been furnished, showing that efficient supervision was generally exercised by District Officers over the maintenance of survey boundary marks in their respective districts. In the Saran district it is reported that but little was effected for want of an available agency for inspection purposes, while in Cuttack it is stated that nothing was done. It is not clear why the matter should present more difficulties in these districts than in any others, and the Board are desired to consider what arrangements are necessary to prevent, as far as possible, a recurrence of such a defect. Under section 114 (1) of the Bengal Tenancy (Amendment) Act, III of 1898, expenses that may be incurred in the maintenance of boundary marks are to be included in the total cost of proceedings to be apportioned under that section.

6. *Chapter IV.—Scientific and National enquiry under Imperial control.*—The report by Major D. Prain, I.M.S., on the result of the study made by him during the year 1896-97 of the races of rape and mustard grown in Bengal, was printed during the year under report and published, with his permission, as a bulletin of the Agricultural Department. Dr. Prain also conducted botanical examinations of various leguminous crops, such as gram, *khesari*, *mung*, &c. Dr. G. Watt, C.I.E., Reporter on Economic Products to the Government of India, having undertaken to make a botanical examination of *sola* and *piper betel*, varieties of those substances were forwarded to him by the Agricultural Department. His report on the result of his investigations into the causes of the betel-nut plague in Eastern Bengal, referred to in the Resolution on the report of last year, is still under preparation. The Lieutenant-Governor desires to acknowledge the value of the services which Dr. Prain and Dr. Watt have rendered during the past few years to the Agricultural Department.

7. *Chemical analyses of soil, water, &c.*—Arrangements have been made to test by actual experiments conducted in selected tracts of the Darbhanga, Muzaffarpur, and Champaran districts, the correctness of the opinions expressed by Dr. Leather, and quoted in the Resolution for the year 1896-97, that the well-water of certain tracts in North Bihar which the raiyats objected to use for the purposes of irrigation, contained no elements injurious to the growth of their crops. Enquiries are also being made into the nature of soils affected by *reh* in North Bihar.

8. *Working of the Civil Veterinary Department, Bengal.*—A separate Resolution, No. 3158, dated the 16th September 1898, has been recorded by this Government on the annual progress report of the Civil Veterinary Department in Bengal, for the year 1897-98.

9. *Chapter V.—Scientific and local enquiry under Provincial direction.*—It has not yet been found possible to commence the special report on the district of Shahabad, similar to those already prepared for a few districts in the Province only by the Assistant Directors in previous years. The Lieutenant-Governor trusts that this work will be taken in hand during the present year.

10. *Experimental Farms.*—Agricultural experiments continued to be conducted at the Sibpur, Burdwan, and Dumraon farms, under the supervision of the Department of Agriculture. The farm at Sibpur has since been made over to the Education Department for use as a demonstration farm in connection with the agricultural classes which were opened in June last. As an experimental farm the results obtained were but of little value owing to the variable composition of the soil. The experiments with manures made there during the year, confirmed the result of the experiments of the preceding year, though in a less marked degree, that saltpetre is a better manuring agent for

cabbages than castor-cake. Similar experiments as well as with new crops and new varieties of existing crops were carried out on a larger scale in the Burdwan and Dumraon farms. The results at the Burdwan farm tended to show that for practical purposes there is little to choose between cowdung and a mixture of bone-meal and saltpetre as a manure for paddy, and between cowdung and castor-cake for potatoes. The results at the Dumraon farm showed that ashes of cowdung made the best manure for paddy, and cowdung itself for wheat, although apparently only on irrigated land. The experimental cultivation of varieties of paddy, sugarcane, maize, potatoes, and sorghum was tried at Burdwan, and of paddy, wheat, potatoes, cotton, maize, and *bajra* in the Dumraon farm during the year. The results obtained showed that the *bansmati* variety of paddy gave the best yield in either farm. As regards potatoes, while the Patna variety yielded the largest outturn in the Burdwan farm, the superiority of those from Naini Tal was demonstrated at the Dumraon farm. In trials with sugarcane and wheat the *shamshara* variety of the former, and the Muzaffarnagar (white) variety of the latter gave the best results. As in previous years, seeds and manures were distributed during the year from both farms to the neighbouring cultivators. In the Lieutenant-Governor's opinion the supply of good seeds to raiyats at cheap rates is a measure likely to produce very beneficial results.

11. *Agricultural experiments in Government, Wards,' and private estates.*—The Lieutenant-Governor regrets to observe that notwithstanding the orders contained in Government Resolution No. 895T.R , dated 9th October 1896, on the subject of the introduction of agricultural improvements in Government and Wards' estates and the hope expressed last year that increased exertions would be made in this direction by the officers connected with their management, the Director still complains of the lack of interest which is met with in dealing with the subject. Mr. Lyon observes that the amalgamation of the allotments for miscellaneous and agricultural improvements in Government estates frequently leads to expenditure on the former at the expense of the latter, while the maintenance of an English vegetable garden, or the cultivation of the proprietor's private lands is too often found to constitute the Manager's idea of agricultural experiment. The Director appears to be making what arrangements he can with the Assistants and Travelling Overseers at his disposal to stimulate an interest in these matters, and the Lieutenant-Governor would again request that the Board will impress upon the Managers of estates subordinate to them that attention to this subject constitutes an integral and important portion of their duties.

The favourite experiment appears to have been that connected with the cultivation of Naini Tal potatoes, probably owing to the very lucrative nature of the crop when successful. Details are given of the trials made with different crops in the various Divisions, and their results. The experimental introduction of lac into the Kalimpong khas mahals in Darjeeling appears to have been commenced without due preliminary enquiry, but the experiments in tobacco-growing in the Chittagong district have been read with interest, and it is to be hoped that endeavours will be made to remedy the defects pointed out by the appraiser, as the crop, properly prepared, would find a ready market. A small agricultural farm has been started at Khurda.

An interesting report of the operations of the Agri-Horticultural Society is quoted by the Director in his report, and their co-operation and assistance is also acknowledged. Revised rules for the conduct of experimental crop-cuttings were circulated during the year, and reports were received collating the results of the experiments of the last three years, from which, however, the data deduced were not altogether consistent or reliable.

12. *Silk experiments.*—Under the revised scheme for the conduct of silk experiments, described in the Resolution on the report for 1896-97, 12 seed-rearing nurseries were working at the commencement of the year and three new ones were opened during it. Since the close of the year, the chief firms interested in the industry have combined and subscribed largely to carry out a scheme on lines similar to those already followed by Government. It is stated that it is now proposed to amalgamate the two schemes, and a special report is promised. The Lieutenant-Governor welcomes this action on the part of those concerned for the improvement of the methods of sericulture, and has read with

pleasure the remarks made by the Director concerning the increased interest taken by the rearers in the demonstration nurseries. The total quantity of cocoons raised during the year in the 15 nurseries was 10,914 *kahans* as compared with 7,329 *kahans* in 1896-97, while the quantities sold for seed to cultivators was 2,843 *kahans*, or 8,500 ounces as against 1,056 *kahans*, or 3,200 ounces sold during 1896-97. These figures are very encouraging.

An Industrial School was opened during the year at Rampur-Boalia by the District Board of Rajshahi, at which practical and theoretical training is given in sericulture. Half the pay of the teacher in charge, who is also a Sericultural Overseer employed under the Agricultural Department, is borne by Government, and there are at present 15 students on the attendance-roll, most of whom are connected with the silk industry of the district.

13. *Chapter VI.—Agricultural Education.*—The final sanction of the Secretary of State for India was obtained during the year under report to the opening of the agricultural classes at Sibpur from the beginning of June 1898. The classes were actually started in July last. The annual cost of their maintenance has been estimated at Rs. 10,000, for which provision will be made in the Budget estimates of the Education Department. The control of the teaching staff and establishment will rest with the Principal of the Sibpur Civil Engineering College, but the nomination to the post of Agricultural Lecturer will be made by the Director of the Department of Land Records and Agriculture, Bengal. Teaching is given in two classes, of which the upper is open to the students of the Engineering College who have passed the F. E. examination and are under 23 years of age; and, subject to the accommodation available, to other candidates nominated by Government, who have either passed the B. A. examination by the B course, or are otherwise considered to be possessed of sufficient educational attainments. Sons and relations of landholders and those desirous of receiving the training for the benefit of their own property, can also be admitted under special conditions. The lower class is open to students of the College who have completed their second year in the Apprentice Department, or to teachers sent from training schools with the sanction of the Director of Public Instruction, Bengal. Appointments in the Provincial and Executive services have been reserved for passed students of the upper classes and their applications for nominations to compete at the ordinary examinations for the same will also be considered; the posts of Managers, or Sub-Managers of estates, or of tahsildars or land stewards are also available to them. The training given in the lower class is designed for kanungoes or candidates for other subordinate posts in the Revenue Service. Detailed information as to the aim and object of opening these classes, and the syllabus of study to be followed therein, have been embodied in this Government Resolution No. 1141, dated 15th March 1898.

14. *Chapter VII.—Publication of Agricultural information.*—The usual forecasts of *rabi*, *bhadoi*, jute, winter rice, wheat, and oil-seed crops, and reports on cotton and indigo crops were published by the Department. Tables of Agricultural Statistics for 1896-97, and a consolidated table showing the average wholesale prices of food-grains, firewood, &c., in the principal marts of Bengal for that year, in addition to a bulletin on the cultivation of mustard, and a monograph on the cotton fabrics of Bengal were also issued.

15. *Chapter VIII.—Emigration to Burma.*—The total number of State Emigrants conveyed during the year to Burma on board the vessels of the British India Steam Navigation Company was 363 as against 241 in 1896-97 and 136 in 1895-96. The total Government subsidy amounted to Rs. 756.

16. *Agricultural exhibitions.*—Agricultural exhibitions were held during the year at the places noted on the margin, a total sum of Rs. 1,275 being spent by Government in the distribution of certificates and prizes. The Lieutenant-Governor would be glad if, in future reports, the Board would briefly describe the agricultural improvements which these exhibitions were designed to stimulate.

(1) Suri in Birbhum.
(2) Madhupur on the East Indian Railway.
(3) Kalimpong in Darjeeling.
(4) Alipur and Falakata in Jalpaiguri.
(5) Bera in Pabna.
(6) Barhampur in Shahabad.
(7) Sonepur in Saran.
(8) Tintanga in Bhagalpur.
(9) Sitamarhi in Muzaffarpur.

17. *Cost of Agricultural experiments.*—The total expenditure during the year on agricultural enquiry and improvement (excluding the pay of the superior establishment, and the expenditure on silk experiments, and the cost of the Civil Veterinary Department) amounted to Rs. 8,407 as compared with Rs. 10,354 in the preceding year.

18. The Lieutenant-Governor desires to acknowledge the value of the services of Mr. W. C. Macpherson, who has now severed his connection with the Department after administering it with conspicuous success for several years, and to thank Mr. Lyon for the energy and devotion which he has shown in maintaining an efficient supervision over the many branches of work in progress. The Director's remarks on the good work done by Mr. Nagendra Nath Banerjee and Mr. Nitya Gopal Mukerjee are also noted.

ORDER.—Ordered, that the Resolution be published in the *Calcutta Gazette*, and a copy of it, together with the Report and the forwarding letter of the Board of Revenue, be submitted to the Government of India, in the Revenue and Agricultural Department, and a copy forwarded also to the Board of Revenue.

By order of the Lieutenant-Governor of Bengal,

F. A. SLACK,

Offg. Secretary to the Government of Bengal.

No. 3564Agri.

COPY forwarded to the Secretary to the Board of Revenue, Land Revenue Department, for the information of the Board.

No. 3565Agri.

COPY forwarded to the Director of the Department of Land Records and Agriculture, Bengal, for information.

Nos. 3566-67Agri.

COPY, with a copy of the report, forwarded to the Appointment / Political Departments of this office for information / information and communication to the Inspector-General of Registration.

By order of the Lieutenant-Governor of Bengal,

FRANK LYALL,

Offg. Under-Secretary to the Govt. of Bengal.

CALCUTTA,
The 28th November 1898.

T. H. G.—Reg. No. 3753C—830—29-11-98.

REPORT

OF THE

DEPARTMENT OF LAND RECORDS AND AGRICULTURE,

BENGAL,

For the year ending 31st March 1899.

Calcutta:

BENGAL SECRETARIAT PRESS.

1899.

Published at the BENGAL SECRETARIAT BOOK DEPÓT,
Writers' Buildings, Calcutta.

OFFICIAL AGENTS.

In India—

THACKER, SPINK & Co., Calcutta.
W. NEWMAN & Co., Calcutta.
THACKER & Co., Bombay.
HIGGINBOTHAM & Co., Madras.
SUPERINTENDENT, AMERICAN BAPTIST MISSION PRESS, Rangoon.

In London—

E. A. ARNOLD, 37 Bedford Street, Strand, W.C.
CONSTABLE & Co., 2 Whitehall Gardens, S.W.
SAMPSON LOW, MARSTON & Co., St. Dunstan's House, Fetter Lane, E.C.
P. S. KING & SON, 9 Bridge Street, Westminster, S.W.
LUZAC & Co., 46 Great Russel Street, W.C.
KEGAN PAUL, TRENCH, TRÜBNER & Co., Charing Cross Road, W.C.
B. QUARITCH, 15 Piccadilly, W.

On the Continent—

FRIEDLÄNDER & SOHN, 11 Carlstrasse, Berlin.
OTTO HARRASSOWITZ, Leipzig.
KARL W. HIERSEMANN, Leipzig.
ERNEST LEROUX, 28 Rue Bonaparte, Paris.
MARTINUS NIJHOFF, The Hague.

TABLE OF CONTENTS.

		Page.
CHAPTER	I.—Prefatory	1
CHAPTER	II.—Land records establishment, and maintenance of boundary marks	1—18
CHAPTER	III.—Utilisation of land records	18
CHAPTER	IV.—Scientific and national enquiry under Imperial control :—Botanical examination of various leguminous crops ; *Æschynomene Indica ;* betel-leaf (*piper* betel, *pán*) ; betel-nut plague in East Bengal ; sugarcane disease (*Trichosphæria sacchari*) ; enquiry regarding the effects of the increasing imports of refined sugar on the cultivation of sugarcane and the profits of the Indian sugar industry ; Juar (*sorghum*) ; jute ; Al (*Morinda tinctoria*) ; chemical analyses of soils by Dr. J. Walter Leather ; saline efflorescence or *reh* in North Bihar ; enquiry regarding the supposed injurious effects of well-irrigation in certain tracts in North Bihar ; cultivation of *rhea* in Bengal ; collection of articles for the Indian Museum and the Imperial Institute, London ; Bengal Veterinary Department—Cattle-breeding	19—22
CHAPTER	V.—Scientific and local enquiry under Provincial direction :—Analyses of districts ; experimental farms ; agricultural experiments and the introduction of new and improved staples in Government, wards', and private estates ; experiments made by the Agri-Horticultural Society of India ; trial of improved agricultural implements in wards', Government, and private estates ; supply of seeds, manures and implements ; crop-cutting experiments by District Officers and Settlement Officers ; crop-cuttings in jail gardens, locusts and other insect-pests ; sericulture ; arboriculture	22—39
CHAPTER	VI.—Agricultural education :—Agricultural classes in the Sibpur Civil Engineering College—The Bengal Veterinary College . . .	40—41
CHAPTER	VII.—Publication of agricultural information	41—42
CHAPTER	VIII.—Final :—Emigration to Burma ; agricultural exhibitions ; applications for patents for inventions ; cost of miscellaneous experiments and enquiries ; increase in the work of the Agricultural Department ; officers of the Department	42—46

APPENDICES.

	Page.
I.—A list of the products of which specimens were collected for the Indian Museum, Calcutta, and for the Imperial Institute, London, during the year ending 31st March 1899	i
II.—A list of the agricultural implements and machines which have been tested in Bengal during the year ending 31st March 1899 and of those in use which are reported to have met with more or less marked success	ii—iv
III—A list showing seeds, implements, manures, etc., distributed by the Department during the year 1898-99	v

INDEX.

	Chapter.	Page.	Para.
A			
Agricultural Department—Increase in the work of the . .	VIII	45—46	127
Agricultural education	VI	40—41	109—110
Agricultural classes, Civil Engineering College—Report on the .	VI	40—41	109
Agricultural exhibitions (See under Exhibition) . . .	VIII	42—45	113—124
Agricultural experiments and the introduction of new and improved staples in Government and wards' and private estates. . .	V	28—32	85— 94
——— in the Bhagalpur Division . . .	V	31	92
——— in the Burdwan „ . . .	V	28	86
——— in the Chittagong „ . . .	V	30	90
——— in the Chota Nagpur „ . . .	V	32	94
——— in the Dacca „ . . .	V	29—30	89
——— in the Orissa „ . . .	V	31—32	93
——— in the Patna „ . . .	V	30	91
——— in the Presidency „ . . .	V	28—29	87
——— in the Rajshahi „ . . .	V	29	88
Agricultural implements—Trial of—in wards, private and Government estates	V	35—36	96
Agri-Horticultural Society of India—Experiments made by the .	V	32—35	95
Ál (*Morinda Tinctoria*)	IV	20—21	73
Analyses of districts	V	22—23	80
Analyses—Chemical—of soils, by Dr. J. W. Leather . .	IV	21	74
Arboriculture	V	39	107—108
B.			
Betel leaf (*Piper betel, pán*)	IV	19	67
Betel-nut plague in East Bengal	IV	19	68
Botanical examination of various leguminous crops . . .	IV	19	65
Boundary marks—Maintenance of	II	13—18	51— 63
——— in the Bhagalpur Division (Bhagalpur, Malda, Sonthal Parganas, and Monghyr) . .	II	17	61
——— in the Burdwan Division (Birbhum, Bankura, Midnapore, and Hooghly)	II	14	56
——— in the Chittagong Division (Chittagong, Tippera and Noakhali)	II	15—16	59
——— in the Chota Nagpur Division (Manbhum, Hazaribagh, Singbhum, Palamau, and Ranchi)	II	17	62
——— in the Dacca Division (Dacca, Mymensingh, Faridpur, and Backergunge) . . .	II	15	58
——— in the Orissa Division (Cuttack, Puri, Angul, and Balasore)	II	17—18	63
——— in the Patna Division (Muzaffarpur, Saran, Gaya, Shahabad, Champaran, Darbhanga, and Patna)	II	16	60
——— in the Presidency Division (24-Parganas, Jessore, and Murshidabad)	II	14	55
——— in the Rajshahi Division) Rajshahi, Jalpaiguri, Rangpur, Darjeeling, Dinajpur, and Bogra)	II	14—15	57
C.			
Cattle-breeding—Bengal Veterinary Department . . .	IV	22	79
Cattle-fair—and horse fair at Berhampore	VIII	44	121
——— Sonepur	VIII	43	119
Cattle-fair at Sitamarhi	VIII	44	120
——— and Agricultural show at Suri	VIII	42—43	114
Collection of articles for the Indian Museum and Imperial Institute, London	IV	22	78
Crop-cutting experiments by District Officers and Settlement Officers	V	36	98
Crop-cuttings in jail gardens	V	36	99

	Chapter.	Page.	Para.
D.			
Date-palm	V	39	107
Divi-divi	V	39	107
E.			
Emigration to Burma	VIII	42	112
Enquiry—scientific and national—under Imperial control	IV	19—22	65— 79
——under Provincial direction	V	22—39	80—108
Eucalyptus	V	39	107
Exhibition—The Alipur and Falakata—and Fair	VIII	43	116
——At Bera in Pabna	VIII	43	117
——of Flowers, Vegetables, and Agricultural Produce at Cuttack	VIII	44—45	124
——The Kalimpong—and Fair	VIII	43	115
——of Flowers and Agricultural Produce at Madhupur	VIII	44	123
——at Rukindipur in Bogra	VIII	43	118
——The Suri Cattle and Agricultural	VIII	42—43	114
——The Tintanga Agricultural	VIII	44	122
Experiments and enquiries—Cost of miscellaneous	VIII	45	126
Experiments—by the Agri-Horticultural Society of India	V	32—35	95
F.			
Farms—Experimental	V	23—28	81— 84
Farm—Burdwan	V	24—26	83
——Dumraon	V	26—28	84
——Sibpur	V	23—24	82
I.			
Inventions—Applications for patents for	VIII	45	125
J.			
Juar (Sorghum)	IV	20	71
Jute	IV	20	72
L.			
Land records establishment	II	1—13	4— 50
—— Utilization of	III	18	64
Locusts and other insect-pests	V	36—37	100—101
M.			
Mutations—Registration of	II	1—13	4— 50
—— in the Bhagalpur Division—in Government and wards' estates	II	13	50
—— in the Burdwan Division—in Government estates (Majnamutha and Jalamutha)	II	6	26
—— in the Burdwan Division in wards' estates (Burdwan Raj Khas Mahals and Sujamutha)	II	3 10—11	13 40— 45
—— in the Chittagong Division	II	4	15
—— in the Dacca Division—in Government estates (Backerganj)	II	4— 5	19— 21
—— in the Dacca Division—in wards' estates (Dakhin Shahbazpur)	II	8— 9	32— 36
—— in Noakhali	II	5	22
—— in North Bihar (Bettiah, Hajipur, and Mahnar)	II	1— 3	4— 12
—— in the Orissa Division—in Government estates (Banki, Noanand, Birso, Angul, and Khurda)	II	5— 6	23— 25
—— in the Orissa Division—in wards' estates (Kujong, Kanika, and Madhupur)	II	9—10	37— 39
—— in the Patna Division—in Government and wards' estates	II	13	49
—— in the Rajshahi Division—in Government estates (Western Duars, Jaipur, and the Darjeeling Terai jotes)	II	6— 8	27— 31
—— in the Rajshahi Division—in wards' estates (Maldwar)	II	11—12	46— 48
O.			
Officers of the Department	VIII	46	128

	Chapter.	Page.	Para.
P.			
Pán (*piper betel, betel* leaf)	IV	19	67
Publication of agricultural information	VII	41—42	111
R.			
Reh or saline efflorescence in North Bihar	IV	21	75
Rhea—Cultivation of—in Bengal	IV	22	77
S.			
Sericultural School—The Rampur Boalia Industrial and .	V	38—39	106
Sericulture	V	37—39	102—106
Sola (*Æschynomene Indica*)	IV	19	66
Sorghum (*Juar*)	IV	20	71
Sugarcane Cultivation and Indian Sugar Industry—Effects of the import of refined sugar on	IV	20	70
Sugarcane disease (*Trichosphæria Sacchari*)	IV	19	69
Supply of seeds, manures, and implements	V	36	97
V.			
Veterinary College—The Bengal	VI	41	110
W.			
Well-irrigation—Enquiry regarding the supposed effects of—in certain tracts in North Bihar	IV	21—22	76

DEPARTMENT OF LAND RECORDS AND AGRICULTURE, BENGAL.

No. 2954A.

FROM P. C. LYON, ESQ., I.C.S.,

Director of the Department of Land Records and Agriculture, Bengal,

TO THE SECRETARY TO THE BOARD OF REVENUE, L.P.

Dated Calcutta, the 31st July 1899.

SIR,

I HAVE the honour to submit the report of the Department of Land Records and Agriculture for the year ending 31st March 1899. This is the fourteenth annual report that has been submitted by this Department on the subject of the work done under the heads of agricultural enquiry, agricultural experiments, and agricultural improvements.

2. According to the instructions laid down in the eighth Resolution of the Government of India, Revenue and Agricultural Department, No. $\frac{3}{39-1}$, dated the 20th March 1897, on the proceedings of the Agricultural Conferences of 1893 and of 1895-96, the report has been divided as follows:—

Chapter I.—Prefatory.
Chapter II.—Land records establishment.
Chapter III.—Utilization of land records.
Chapter IV.—Scientific and national enquiry under Imperial control.
Chapter V.—Scientific and local enquiry under Provincial direction.
Chapter VI.—Agricultural education.
Chapter VII.—Publication of agricultural information.
Chapter VIII.—Final.

CHAPTER I.

PREFATORY.

3. I was in charge of the Department throughout the year under report. A full account of the tours of the Director is given each year in the annual report for the survey and settlement year, which ends on the 30th of September.

Messrs. Nagendra Nath Banerjei and Dijen Lala Roy were my Assistant Directors throughout the year.

CHAPTER II.

LAND RECORDS ESTABLISHMENT.

4. In accordance with the orders of Government conveyed in Resolution No. 812T.R., dated 8th October 1897, I submitted a full report on the working of the Land Records Maintenance Act III (B.C.) of 1895 with my letter No. 1294S., dated 5th July 1898, and the conclusions come to by me in that report as to the failure of the Act to justify its title were noted by me in my Annual Report for the year ending 31st March 1898.

The subject of the working of this Act and of the means to be taken to maintain the land records of North Bihar, either by a system of record of mutations or by periodical revision on the ground, has not yet, however, been finally dealt with by Government. The Board of Revenue, not being convinced by the arguments laid before them by me that the existing Act could not be worked with advantage, made some further suggestions as to its future working,

and called for opinions on their proposals from the Settlement Officer in North Bihar and myself. The reports embodying these opinions were forwarded by me to the Board with my letter No. 100T.S., dated 20th May 1899. Mr. Stevenson-Moore expressed himself as doubtful whether any such scheme as that sketched by the Board could be worked with advantage, and in my covering letter I intimated my complete agreement in Mr. Stevenson-Moore's views, and suggested that, for the reasons I had already laid before the Board, we should rely no further on the Act for the continual maintenance of our land records.

5. I may note here that, although the Board suggested a scheme for working the Act, they came to the following conclusions in their preliminary report upon it:—

(1) That any scheme for the maintenance of the records by patwaris or other local agency is unsuitable for North Bihar, and for permanently-settled districts in general.

(2) That the present Act is admittedly imperfect, and cannot be looked to for any real maintenance of the record up to date.

(3) That it is to be assumed, in considering any scheme for the enforcement of the Act, that the records are to be revised completely at the end of ten or fifteen years.

In the face of these conclusions, it appears to me to be clearly not worth while to devise elaborate plans for the working of an Act which has failed to attain its immediate object, and which cannot be pressed without serious danger of harassment to the people.

6. Pending the orders of Government as to the future working of the Act, the three offices already in existence for the registration of mutations, at Bettiah in Champaran, and at Hajipur and Mahnar in Muzaffarpur, were kept open, but in view of the reports I have already submitted as to their working, I do not propose to review the statistics of their operations during the past year in any great detail. Those statistics show that registrations have on the whole fallen off, and the figures which were shown to be inadequate in 1897-98 are still smaller in 1898-99.

7. The following statistics are taken from the annual returns of the Inspector-General of Registration, of which that officer has kindly provided me with an advance copy.

8. The total number of mutations relating to all classes of tenures and tenancies registered during the year amounted to 297 in Bettiah, 1,412 in Hajipur and 3,093 in Mahnar, or a total of 4,802. Of these, 2,809 were registrations of transfers by sale, and the rest were cases of inheritance. The 2,809 mutations arising out of transfers by sale involved the transfer of 758 whole holdings and of 2,076 portions of holdings. These figures are compared with those of previous years in paragraph 10 below.

9. The total number of notices for registration which were filed amounted to 3,873, of which 2,061 were voluntarily presented by the parties under section 6, and the remaining were prepared by the Registrar himself, with reference to transfers that had come before him as Registrar of Assurances, in accordance with the provisions of rule 5.

As these notices give some indication of the interest taken by the people themselves in the Act, I note below the comparative figures for the past three years:—

Office.	Section 6.			Rule 5.		
	1896-97.	1897-98.	1898-99.	1896-97.	1897-98.	1898-99.
1	2	3	4	5	6	7
Bettiah ...	769	214	17	524	855	268
Hajipur ...	2,411	1,182	792	573	783	639
Mahnar ...	1,107	2,667	1,252	146	471	905
Total ...	4,287	4,063	2,061	1,243	2,109	1,812

The great fall in the figures under section 6 shows how little the people are now voluntarily resorting to these offices. The figures under rule 5 are merely an index to the number of transfers of immoveable property annually registered by the Registrar of Assurances, and these constitute but a small proportion of the actual transfers of such property that take place from various causes.

10. The following table gives an analysis of the nature of the mutations registered during the past three years:—

Thana.	Office.	Permanent tenures.						Temporary tenures.						Holdings at fixed rates.					
		Transfer.			Succession.			Transfer.			Succession.			Transfer.			Succession.		
		1896-97.	1897-98.	1898-99.	1896-97.	1897-98.	1898-99.	1896-97.	1897-98.	1898-99.	1896-97.	1897-98.	1898-99.	1896-97.	1897-98.	1898-99.	1896-97.	1897-98.	1898-99.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Bettiah ...	Bettiah ...	...	1	...	...	...	...	41	99	10	7	6	...	1	8	...	...	1	...
Hajipur ...	Hajipur ...	1	...	16	...	...	11	...	...	...	...	...	...	329	373	168	35	139	73
Do. ...	Mahnar ...	...	14	24	...	12	40	...	2	...	...	...	2	43	80	49	4	53	45
	Total ...	1	15	40	...	12	51	41	101	10	7	6	2	373	461	217	39	193	118

Thana.	Office.	Occupancy holdings.						Other holdings.						Total number of mutations registered.		
		Transfer.			Succession.			Transfer.			Succession.					
		1896-97.	1897-98.	1898-99.	1896-97.	1897-98.	1898-99.	1896-97.	1897-98.	1898-99.	1896-97.	1897-98.	1898-99.	1896-97.	1897-98.	1898-99.
		21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Bettiah ...	Bettiah ...	1,081	928	260	50	9	5	...	59	22	...	1	...	1,180	1,112	297
Hajipur ...	Hajipur ...	1,176	1,180	764	120	288	285	118	137	68	10	22	27	1,789	2,189	1,412
Do. ...	Mahnar ...	538	1,433	1,370	57	788	1,457	7	88	58	...	60	48	649	2,539	3,093
	Total ...	2,795	3,541	2,394	227	1,085	1,747	125	284	148	10	92	75	3,618	5,790	4,802

The above figures show that the office at Bettiah has failed conspicuously, and that the work in Hajipur is falling off. The larger figures for Mahnar are due, to some extent, to the heavy arrears worked off during the year, and it is not likely that they will be maintained, in view of the great falling off in the number of notices presented during the year.

11. As noted in my last Annual Report, the average percentage of transfers which occur annually has been calculated by various officers at from 8 to 10 per cent. The following table shows the actual percentage given by the transfers registered during the past three years:—

Thana.	Percentage of mutations registered to number of holdings.		
	1896-97.	1897-98.	1898-99.
Bettiah	2·22	2·09	·56
Hajipur, including Mahnar	1·76	3·37	3·25

12. The total expenditure incurred during the year was Rs. 3,510, of which Rs. 1,080 was spent in the Bettiah office, Rs. 1,226 in the Hajipur office and Rs. 1,204 in the Mahnar office. The total receipts amounted to Rs. 1,800, which were thus distributed,—Rs. 34 in the Bettiah office, Rs. 635 in the Hajipur office and Rs. 1,131 in the Mahnar office. The deficit of Rs. 1,710 shown by the above figures was borne by Government.

13. As noted in my Annual Report for 1897-98 the Act for the Maintenance of Land Records has also been introduced in the Sujamutha estate of the Burdwán Ráj, in the district of Midnapore, but it has not been actually brought into operation there pending the complete revision of the settlement records by the sub-manager of the estate. Government has now directed that the orders directing the commencement of mutation work under the Act shall be held in abeyance pending the decision as to the action to be taken to maintain the records in North Bihar. In the meantime the revision of the records by the Sub-manager and his establishment will continue.

14. The scheme for the maintenance of the records in Orissa has not yet been finally framed. A Bill for the imposition of a patwari cess and the creation of a local staff of patwaris and kanungoes has now been prepared, and rules

have been framed for working the scheme approved of by the Government of India. His Honour the Lieutenant-Governor has, however, permitted the Settlement Officer and myself to raise again the question of maintaining the records by means of periodical revisions on the ground, rather than by annual reports and returns, and the Settlement Officer has reported strongly in favour of this alternative. His report, together with the draft Bill and rules, are now under submission to the Board, and I have ventured to urge in my report that the proposed legislation be abandoned, both on account of the heavy extra expenditure that will be incurred under the patwari scheme, and of the serious danger of harassment to the raiyats involved in it, and I have suggested that we may safely content ourselves with a revision of the settlement records fifteen years hence, when half the term of the present settlement shall have expired.

15. No special scheme has been adopted for the maintenance of records in Chittagong, and the necessary mutation work will be carried out by the tahsil establishments maintained for the collection of revenue in Government estates. A complete report on the subject is due to the Board, and will be submitted by me at an early date.

16. In the following paragraphs an account is given of the work done for the maintenance of the records recently prepared in various Government, Wards' and private estates, and of the action that has been taken to carry out the wishes of Government as expressed in the Resolution on my last Annual Report, and to render this work more effective for the purpose for which it has been instituted, that of the annual correction of the rent-roll of each estate, and its maintenance up to date.

17. The Commissioners of the Burdwan, Rajshahi, Dacca and Orissa Divisions, within whose jurisdictions this work of the registration of mutations has been carried on during the last few years were addressed by me on the subject of the orders contained in the Government Resolutions on the last two Annual Reports of this Department, and they were asked to issue such orders as they might think right to secure accuracy for the returns of mutations to be submitted by their District Officers, and to favour me with their comments on the work that had been done in this respect when forwarding those returns. They were further asked that, if the number of mutations reported was inadequate, or if the returns were in other respects unsatisfactory, the cause might be explained, and also that the number of mutations of each class that might, in their opinion, be reasonably expected to occur annually in each case, might be noted.

18. The information which has been furnished by the Commissioners in answer to my letter is submitted below. The figures for the year under report have been where possible compared with those of the two previous years, and, so far as they would permit, have also been analysed in detail. The Government and temporarily-settled estates have been dealt with first, and after them he Wards' estates.

GOVERNMENT ESTATES IN THE DACCA DIVISION.

Backerganj.

Total area of 14 estates—48,859 acres.
Total number of tenancies—1,819.

19. The subjoined table represents the number of mutations recorded during the year, and the number of tenancies and the area covered by them :—

Cause of mutation.	Number of mutations.	Number of tenancies transferred.		Area in acres transferred.	Average price per acre of land transferred.
		In whole.	In part.		
1	2	3	4	5	6
					Rs.
Sale ...	107	59	29	2,415	50
Succession ...	102	86	16	5,151	...
Total ...	209	145	45	7,566	...

20. The number of mutations recorded during the last three years are shown in the table below:—

Year.	Number of mutations recorded.	Percentage of mutations on—		Average area in acres covered by a transfer.
		Total number of tenancies.	Total area.	
1	2	3	4	5
1896-97	96	8·4	8·1	36·8
1897-98	127	7·32	15·94	53·5
1898-99	209	11·4	15·4	36·2

21. In the 14 estates concerned the work of registration would appear to have been adequately performed, but the Collector reports that in 8 other estates, for which he has given no figures of area or tenancies, blank returns were sent in by the tahsildars. It is doubtful whether these returns were correct, and the tahsildars in question should be pressed to give due attention to this work. These estates should also be included in future returns, so that their area, and the number of tenancies in them, may be added to the total on which the percentages are calculated. No figures have been given for the large estates of Tushkali and Heshamuddin, the new settlements of which had not been confirmed up to the close of the year.

GOVERNMENT ESTATES IN THE CHITTAGONG DIVISION.

Noakhali.

22. No returns have yet been received for the estates in this district. They have only been recently settled, but mutation work should commence in the current year.

THE GOVERNMENT ESTATES IN ORISSA.

Banki in *Cuttack* ...	Area	74,889	acres.
	Total number of tenancies...	20,053	
Noanand and Birso in *Balasore*	Area	17,890	„
	Tenancies	6,305	
Angul	Area	408,849	„
	Tenancies	28,579	
Khurda in *Puri*	Area	565,356	„
	Tenancies	176,753	

23. Some statistics are given below of the mutation work done during the year, but it is unnecessary to analyse them in any detail, as the rules for the work are in each estate under revision, and the past year has been one of change and re-arrangement. In Banki the Collector, Mr. Growse, and his successor, Mr. Carey, have carefully inspected the mutation registers, and have reported fully on the work being done, and new and improved methods are being introduced. In Angul the Deputy Commissioner has gone with equal thoroughness into the question, and is now engaged on bringing the records up to date, preliminary to the commencement of mutation work on an amended system. In the two Balasore estates the work has been more or less suspended until the records prepared at the present settlement have been transcribed into the estate papers, and in Khurda some intermediate mutation work only is in progress pending final orders on the proposals that have been sent up for the maintenance of the settlement records up to date.

24. The number of mutations of each class registered in each estate during the year under report, together with the number of tenancies affected and the areas transferred, are shown in the following table:—

Cause of mutation.	Name of estate.	Number of mutations.	Number of tenancies transferred.		Area in acres. transferred.	Average price per acre of land sold.
			In whole.	In part.		
1	2	3	4	5	6	7
Sale ...	Banki	4,844	3,668	...	2,188	Rs. 19.
	Noanand and Birso ...	59	11	48	74	
	Angul	45	1	44	110	19 times the rent.
	Khurda	1,054	342	776	760	Rs. 111.
Succession ...	Banki	7,067	6,510	...	9,812	
	Noanand and Birso ...	10	6	4	16	
	Angul	816	816	...	4,916	
	Khurda	9	16	6	25	
Partition ...	Banki	2,058	1,381	...	1,943	
	Noanand and Birso ...	9	9	...	6	
	Angul	13	13	...	107	
	Khurda	...	...	...	...	
Gift ...	Banki	63	61	...	27	
	Noanand and Birso ...	1	1	...	...	Under one acre.
	Angul	1	...	1	11	
	Khurda	1	2	...	8	
	Total ...	16,050	12,837	879	20,003	

25. The figures for Banki clearly do not represent the transfers that have taken place in the past year, and there has either been some confusion by which plots have been substituted for tenancies, or the figures are the result of a wholesale revision by the sarbarahkars, and include most of the transfers that have taken place since the completion of the records in 1892.

GOVERNMENT ESTATES IN THE BURDWAN DIVISION.

26. No returns of the work of registering mutations in the Majnamutha and Jalamutha estates in the district of Midnapore are submitted to this office. These estates are shortly to be re-surveyed and re-settled under the Bengal Tenancy Act.

The resettlement of the Pataspur estates in the same district has been recently completed and the registering of mutations has not yet begun. The Board of Revenue have recently recommended to Government that the introduction of a system of maintenance of the records, and the reorganisation of the patwari staff, may be reserved until orders have been passed as to the scheme to be adopted for similar work in Orissa. The pargana of Pataspur has been included in all previous legislation on the subject of patwaris in Orissa, and it seems advisable to maintain this connection, the circumstances of its estates being in all respects similar to those of the Orissa temporarily-settled estates.

GOVERNMENT ESTATES IN THE RAJSHAHI DIVISION.

The Western Duars in *Jalpaiguri*	Area ...	...	504,638 acres.
	Tenancies	...	21,147
The Jaipur estates in *Bogra* (Nos. 798 and 799.)	Area ...	...	28,233 „
	Tenancies	...	6,544
The *Darjeeling* Terai jotes	Area ...	...	124,376 „
	Tenancies	...	834

27. The following table represents the work done during the year under report:—

Cause of mutation.	Name of estate.	Number of mutations.	Number of Tenancies transferred.		Area in acres transferred.	Average price per acre of land transferred by sale.
			In whole.	In part.		
1	2	3	4	5	6	7
Sales ...	The Western Duars estate	600	284	246	13,083	
	The Jaipur estates in Bogra	66	66	...	215	Rs. 20.
	The Darjeeling Terai jotes	5	1	4	239	Rs. 200 to 300.
Succession ...	The Western Duars estate	348	85	254	9,025	
	The Jaipur estates in Bogra	2	2	...	9	
	The Darjeeling Terai jotes	8	3	5	610	
Partition ...	The Western Duars estate	12	5	5	166	
	The Jaipur estates in Bogra	...	...	...	...	
	The Darjeeling Terai jotes	...	...	...	...	
Gift ...	The Western Duars estate	14	1	12	237	
	The Jaipur estates in Bogra	...	...	...	...	
	The Darjeeling Terai jotes	1	...	1	17	
	Total ...	1,056	447	527	23,601	

NOTE.—The apparent difference in some cases between the figures in column 3 and the totals of columns 4 and 5 is due to several jotes having been transferred more than once in part.

28. The price per acre of land transferred by sale in the Western Duars estate has not been stated, and the omission is explained to be due to there being no column in the register of applications for mutations. Last year the information was furnished with respect to the Falakata tahsil, and I will ask that arrangements may now be made to furnish complete information on this point in the current year. The price per acre of land in the Terai jotes appears to be exceptionally high, and the figure will be carefully tested for future returns.

29. While the figures returned for the Western Duars appear to be fairly accurate, those returned for the Darjeeling Terai jotes and the Jaipur estates are patently inadequate. The resettlement of these estates has, however, only recently been concluded, and mutation returns for them have been submitted this year for the first time. The Commissioner has addressed the District Officers with a view to secure better results in future years, and a complete set of rules has been drafted for the conduct of this work, and the maintenance of the rent-roll up to date, by means of the existing local agency in the Jaipur estates. These rules have been submitted to the Commissioner for his approval, and it is hoped that their introduction will eventually secure a systematic record of all mutations.

30. The following is a comparative statement of the results of mutation work in the Western Duars during the year under report as compared with those of the previous year:—

Estate.	Year.	Mutations.	Percentage of mutations on total—		Average area in acres covered by a transfer.
			Number of tenancies.	Area.	
1	2	3	4	5	6
The Western Duars.	1897-98 ...	1,025	4·84	4·74	23·3
	1898-99 ...	974	4·60	4·46	23·1

31. There were altogether 69 tenancies vacant at the commencement of the year. Of these 36 have been resettled. In addition to the tenancies resettled 478 new tenancies formed out of waste lands were settled, some at the settlement rates, but most of them according to rates fixed in the waste land rules.

WARDS' ESTATES IN THE DACCA DIVISION.

Backerganj.

The Dakhin Shahbazpur Estate	Area ...	...	93,298 acres.
	Tenancies	...	30,125

32. The year's work is embodied in the following table :—

Cause of mutation.	Number of mutations.	Number of tenancies transferred—		Area in acres transferred.	Average price per acre of land sold.
		In whole.	In part.		
1	2	3	4	5	6
					Rs.
Sale ...	139	69	60	352	40
Succession ...	212	45	137	173	
Partition ...	.....	.....	.....	.....	
Gift ...	6	2	4	4	
Total ...	357	116	201	529	

33. The following is a comparative statement of the results of mutation work done in the preceding year and the year under report : —

Year.	Number of mutations recorded.	Percentage of mutations on—		Average area in acres covered by a transfer.
		The total number of tenancies.	Total area.	
1	2	3	4	5
1897-98	508	1·65	1·07	2·02
1898-99	357	1·05	·56	1·5

34. The figures returned appear to be inadequate, being only a third of the figures given by the Collector as his estimate of the probable number of transfers that have actually taken place. These figures are—

Sales	300
Successions	800
Gifts	50
Total, ...	1,150

As to the inadequacy of the returns, the Collector, who called for an explanation in this matter from the tahsildars, writes as follows :—

" ***All the tahsildars excuse themselves on the ground of pressure of collection duties. I cannot accept this excuse, as it is very easy to ascertain mutations when rent is being paid.

An additional excuse made in some cases is that the tenants do not file applications for mutation, although asked to do so. There is of course an obvious explanation of this phenomenon. I have therefore directed that the tahsildars should submit lists of mutations which come to their notice, whether applications are filed or not. Action will be taken on these lists after the manager or sub-manager has satisfied himself by local enquiry of their accuracy."

35. To facilitate the collection of information as to cases of transfer in the Court of Wards' estates effected by documents registered in the registration offices, the Sub-Registrars in the Bhola subdivision have been instructed to mark off those cases in their registers, so that the manager may take note of them when out on his inspection tours. At the same time stringent measures are being taken to have field-to-field enquiries regularly made, and it may be hoped that the returns will show more adequate figures next year.

36. Twenty-seven tenancies with an aggregate area of 463 acres fell vacant during the year, of which 12 tenancies with an aggregate area of 155 acres appear to have been resettled. The new holdings from waste lands settled during the year numbered 35, with an aggregate area of 51 acres. Six of them were settled at special rates, and the rest at settlement rates.

WARDS' ESTATES IN THE ORISSA DIVISION.

Cuttack.

Kujong	...	Area	236,878	acres.
		Tenancies	34,687	
Kanika	...	Area	281,478	,,
		Tenancies	30,980	
Madhupur	...	Area	51,643	,,
		Tenancies	24,125	

37. The record of the year's work is as follows:—

Cause of mutation.	Name of estate.	Number of mutations.	Number of tenancies transferred— In whole.	In part.	Area in acres transferred.	Average price per acre of land transferred by sale.
1	2	3	4	5	6	7
						Rs.
Sale ...	Kujong	51	45	6	354	20
	Kanika	581	195	386	1,154	16
	Madhupur	3	2	1	3	41
Succession ...	Kujong	475	406	69	1,083	...
	Kanika	488	488	...	2,040	...
	Madhupur	...	...	...	...	...
Partition ...	Kujong	...	...	...	...	...
	Kanika	60	60	...	292	
	Madhupur	...	...	...	...	...
Gift ...	Kujong	...	...	...	...	...
	Kanika	3	2	1	7	...
	Madhupur	1	1	...	12	...
	Total ...	1,662	1,219	463	4,945	...

38. Settlement work has only recently been completed in the Madhupur estate, and mutation work has hardly been begun, which explains the inadequacy of the figures.

The returns from the Kanika estate are probably fairly accurate, but those from Kujong are patently incomplete. The reason for this is undoubtedly the policy adopted by the manager of refusing to recognise transfers made without his consent, a matter which is dealt with in paragraphs 41 to 44 below, in which the returns for the Burdwan Raj estates in the Burdwan Division are analysed.

39. The table below is a comparative statement of the results of mutation work done in the Kanika estate in the years 1896-97, 1897-98 and 1898-99 and in the Kujong estate in 1897-98 and 1898-99 :—

Name of estate.	Year.	Number of mutations.	Pecentage of mutations on total—		Average area in acres covered by a transfer.
			Number of tenancies.	Area.	
1	2	3	4	5	6
Kanika	1896-97	1,520	4·90	1·99	3·69
	1897-98	755	2·43	·66	2·48
	1898-99	1,132	3·65	1·24	3·08
Kujong	1896-97	Not available.			
	1897-98	89	·27	·15	4·16
	1898-99	526	1·51	·60	2·73

There has been a marked improvement in the past year in the record of mutations on account of successions in the Kujong estate.

WARDS' ESTATES IN THE BURDWAN DIVISION.

The Burdwan Raj estates held direct in *Burdwan.*	Area	79,582 acres.
	Tenancies ...	14,527
The Sujamutha estate in *Midnapore* ...	Area	27,055 acres.
	Tenancies ...	11,120

40. Both the estates are the property of the minor Maharaja of Burdwan. The record of the year's work is as follows :—

Cause of mutation.	Name of estate.	Number of mutations.	Number of tenancies transferred—		Area in acres transferred.	Average price per acre of land transferred by sale.
			In whole.	In part.		
1	2	3	4	5	6	7
						Rs.
Sale ...	The Burdwan Raj khas mahal.	94	94	...	363	
	The Sujamutha estate ...	49	29	20	81	72
Succession ...	The Burdwan Raj khas mahal.	233	233	...	882	
	The Sujamutha estate ...	...	...	...	...	
Partition ...	The Burdwan Raj khas mahal.	3	2	1	4	
	The Sujamutha estate ...	1	...	1	3	
Gift ...	The Burdwan Raj khas mahal.	...	...	...	...	
	The Sujamutha estate ...	...	...	...	...	
By rectification of mistakes found in the settlement records.	The Sujamutha estate ..	45	10	35	49	
	Total ...	425	368	57	1,382	

41. The following is a comparative statement of the results of mutation work obtained in the Burdwan Raj *khás* estate during 1896-97 to 1898-99 and in the Sujamutha estate during 1897-98 and 1898-99;—

Name of estate.	Year.	Number of mutations.	Percentage of mutations on total—		Average area in acres covered by a transfer.
			Number of tenancies.	Area.	
1	2	3	4	5	6
The Burdwan Raj *khas* estate.	1896-97	13	·08	·05	3·38
	1897-98	23	·16	·07	2·47
	1898-99	330	2·27	1·56	3·78
The Sujamutha estate	1896-97	...	.....	.....	.....
	1897-98	85	·76	·59	1·85
	1898-99	95	·85	·49	1·4

42. It is unnecessary for me to comment at any length on these figures. They are clearly inadequate, and the reasons for their inadequacy are equally patent. The manager charges a fee on all mutations recorded in his office, and at the same time refuses to recognise transfers of holdings by sale made without his consent, or transfers due to inheritance which have not been duly registered by the tenants in his office. In other words he requires the tenants to help him to keep his rent-roll up to date, and to pay him for the clerical labour involved in that work. The results are that transfers are not reported, and that the rent-rolls of both these estates are becoming more inaccurate every year.

43. One of the reasons for the manager's action is that he strenuously refuses to admit that occupancy rights are transferable by custom within the villages of the Raj, and, at the invitation of Government and the Board, he has recently submitted a report on the question, which I have just received from the Commissioner. The report gives, in my opinion, no ground for doubting the confident declaration of the Settlement Officer, in his final report on the settlement of these estates, that the custom of transfer has long since been established. The report is now under submission to the Board.

44. I am not aware whether Government will wish to press the preparation of more accurate statistics of mutations upon the manager. In their present form the returns are altogether useless for any purpose whatever, as was remarked by Government in its Resolution on my last Annual Report, and I would suggest that unless they are to be amended their submission may be dispensed with in future.

45. There were 89 tenancies with an aggregate area of 133 acres in the Sujamutha estate, and 642 tenancies with an aggregate area of 1,564 acres in the Burdwan Raj estate, vacant at the commencement of the past year, or vacated in the course of it, and the resettlement was effected of 41 tenancies with an aggregate area of 53 acres in Sujamutha, and of 153 tenancies with an aggregate area of 825 acres in the Burdwan estate. In the former estate 133 new tenancies with a total area of 240 acres, formed out of waste lands, and in the latter estate 43 such tenancies with a total area of 441 acres, were settled during the year.

WARDS' ESTATES IN THE RAJSHAHI DIVISION.

Dinajpur.

The Maldwar estate	Total area	88,329	acres.
	Tenancies	10,837	

46. The estate is divided according to its situation in two districts into two circles, one in Purnea and one in Dinajpur. The record of the work done during the year stands as follows:—

Cause of mutation.	Name of circle.	Number of mutations.	Number of tenancies transferred in—		Area in acres transferred.	Average price per acre of land sold.
			Whole.	Part.		
1	2	3	4	5	6	7
Sale ..	Purnea ...	8	60	13	367	
	Dinajpur ...	65				
Succession ...	Purnea ...	336	586	...	3,542	
	Dinajpur ...	250				
Gift and partition.	Purnea ...	...	...	...	...	
	Dinajpur ...					
Benami ...	Purnea ...	...	12	...	57	
	Dinajpur ...	12				
	Total ...	671	658	13	3,966	

47. The following table shows the results of mutation work done from 1896-97 to 1898-99 :—

Year.	Number of mutations.	Percentage of mutations on total—		Average area in acres covered by a transfer.
		Number of tenancies.	Area.	
1	2	3	4	5
1896-97	5	·04	·04	8
1897-98	130	1·2	·96	7
1898-98	671	6·2	4·4	6

The above figures show a great improvement in the past year, the manager having paid much attention to the subject, and the reduction of the fees charged on mutations having apparently had a good effect. The following revised rules for the levy of mutation fees were approved by the Board in the course of the year :—

(1) That mutation fees should be charged on the voluntary transfer of holdings by sale and by gift, and on auction sale by persons other than the landlord.
(2) That both in the Dinajpur and Purnea circles, the fee should be charged on the annual rent of the holding and not on the market value.
(3) That the fee should be 2 per cent. of the annual rent.
(4) That it should not be less than Re. 1 or more than Rs. 100.

48. There were altogether 669 tenancies lying vacant at the commencement of the year. Of these 89 only appear to have been re-settled. The manager has explained that the effects of the recent famine are responsible both for the large number of abandoned jotes and for the slow rate at which they are being re-settled. He appears to be fully alive to the importance of this work, and is confident that many of the vacant tenancies will find occupants in the current year. There were 29 new tenancies settled in waste lands during the year, some at the prevailing rates of the villages in which the lands are situated, and some at the settlement rates.

GOVERNMENT AND WARDS' ESTATES IN THE PATNA DIVISION.

49. No returns have as yet been received of mutation work in the Government estates in Gaya, or of that done in the Tikari Ward's estate in the same district. Returns will be asked for in the current year.

WARDS' ESTATES IN THE BHAGALPUR DIVISION.

50. No returns have been received of the mutation work done in the Narhan Ward's estate in the Monghyr district. The attention of the Commissioner will be called to this matter with a view to the submission of the returns for the present year. The work done in the Purnea division of the Maldwar Estate has been dealt with in paragraphs 46 to 48 above.

MAINTENANCE OF BOUNDARY MARKS.

51. As the reports submitted by District Officers on this subject showed that much doubt existed as to the nature of the boundary marks concerning which an annual report was required from them under the rules contained in Chapter 4, Part II of the Survey and Settlement Manual, I referred the question to the Board, who ruled that the only marks to be dealt with under that chapter were those erected in connection with cadastral surveys and other surveys which demarcate the boundaries of estates or tenures, or of lands which have been the subject of dispute in the course of settlement proceedings. In the summary given below of the action taken to inspect and restore permanent boundary marks, I have accordingly only dealt with those included in the Board's definition. I am still, however, in correspondence with District Officers with a view to the tabulation of definite information as to the number and position of such marks within each district, and the preparation of detailed rules for their inspection and maintenance.

52. There are two separate sets of districts to be dealt with—

(1) Those which have been completely surveyed cadastrally, or are in course of such survey.

(2) Those which have not been completely surveyed cadastrally, but in which either—

(*a*) Government or Wards' estates, or

(*b*) Private estates,

have come under cadastral survey.

In the first case it is clear that the permanent marks to be inspected and maintained must be shown on skeleton maps, and must be numbered and registered, and that they must be systematically inspected by local officers. Mr. C. J. Stevenson-Moore, Settlement Officer in North Bihar, has recently submitted a carefully thought-out scheme for this work, and I am awaiting an expression of the opinion of the Commissioner and the Collectors of the North Bihar districts on this scheme before submitting it to the Board. The rules proposed for North Bihar will probably apply equally to the Chittagong district and the districts of the Orissa Division, and the thana *mauzawar* maps, on the scale of 1″=1 mile, which it is proposed to prepare in all these districts, will show all the marks that it is proposed to maintain.

Where complete districts have not been surveyed, it will be apparently necessary to prepare special maps to show existing permanent boundary marks, and their inspection and maintenance will have to be entrusted to the officials of the estates concerned. In the case of Government and wards' estates this can be effectively done, but when the proprietors of private estates do not appreciate the advantages to be gained by a proper maintenance of their boundaries, it will be more difficult.

53. In submitting a further report to Government on this subject, I shall have to deal also with the legal liabilities of private persons with respect to these permanent boundary marks, a matter of no small intricacy, and which has already formed the subject of correspondence between the Board, the Government of Bengal, and the Government of India. The question of the recovery of the cost of maintaining and repairing such marks is also one

of some difficulty. I hope, however, to be able to complete my correspondence with local officers and to submit my special report on the subject in the course of the current year.

54. The following is a *resumé*, of the information furnished by local officers as to the action taken during the year under report for the maintenance of permanent boundary marks under Part II, Chapter IV, of the Survey and Settlement Manual, 1895. The reports submitted for the districts of Cuttack and Saran are to the same effect as those submitted last year. In the Resolution on my last Annual Report, Government enquired why the question of the maintenance of boundary marks should present more difficulties in these districts than in any others, and a report was called for on this point. In my letter No. 474S., dated 11th March, 1899, I explained that the difficulties which were felt by the Collectors of these districts in carrying out any real inspection of boundary marks are felt by all Collectors of districts in which there have been extensive survey and settlement operations.

The Presidency Division.

55. *The 24-Parganas.*—The iron pillars erected in the Panchanagram estate in the Sadar subdivision, and the marks in the Government estates in the Barasat subdivision, were found in good condition. In the Basirhat subdivision 100 iron pillars were put up in the place of the old masonry pillars, and are reported to be in good order.

Jessore.—In the Gazipur khas mahal 13 pillars will have to be reconstructed, and 7 require repairs.

Murshidabad.—The permanent boundary marks were all found to exist as before.

Burdwan Division.

56. *Birbhum.*—The masonry pillars in the Kushmore estate were inspected by the Tahsildar and found to be in good repair. In the Mollarpur estate the earthen mounds erected to mark the trijunction points of villages are gradually disappearing. It is not reported whether any action has been taken to restore them, or to supply their place with more permanent marks. In the Hukumapur estate belonging to the Burdwan Raj the survey pillars were inspected, and those missing have been replaced by fresh ones.

Bankura.—The permanent survey marks in the *ghatwali* lands were found to have been generally placed in proper places and to be in good repair. A few are missing; but as Government's direct connection with these lands will cease with the conclusion of the present settlement of them, the Collector considers that it is unnecessary to make any attempt to replace the lost pillars.

Midnapore.—Extensive inspections and enquiries were made through the Tahsildars of Government estates, the Managers of wards' estates and village chaukidars, and it was found that 194 marks, including some earthen ones, had been partially damaged, 154 marks had been entirely destroyed, had sunk under ground or had otherwise disappeared; while 37 marks had been washed away by floods. The list of lost and damaged marks is a very heavy one, and nothing has been said as to the steps taken to replace them. This matter can be conveniently dealt with when the extensive survey and settlement operations in contemplation in the Government estates of this district are initiated. One prosecution was instituted on a charge of destroying or removing boundary marks, but the offence was not ultimately established.

Hooghly.—Inspections were made by the Subdivisional Officers and the Sub-Deputy Collector, and a separate report is promised by the Collector as to the condition of the permanent boundary marks as soon as the enquiries have been completed A sum of Rs. 58 was spent on repairs to boundary pillars in Government estates.

Rajshahi Division.

57. *Rajshahi.*—Enquiries were made as to the condition of the permanent boundary marks through the village chaukidars and panchayets, with

the result that in six villages in the Lálpur thana the iron pillars were found more or less damaged, one having sunk under ground; and in one village in the Charghat thana an iron pillar was found broken. Steps are being taken to repair or replace these pillars and those which were reported as damaged in previous years.

Jalpaiguri.—The Deputy Commissioner has had no inspection made of the survey trijunctional boundary marks in the course of the year, and has reported certain difficulties found by him in carrying out any such inspections. The difficulties do not appear insurmountable, and it is to be hoped that action will be taken through the Tahsildars to commence a systematic inspection of these marks in the current year.

Rangpur.—The existing pillars are in good condition. There was a report at the close of the year that the pillars on the Assam Frontier had been removed. The Collector doubts the truth of the report, but will make enquiry into the matter as early as possible.

Darjeeling.—The marks on the Government estates at Kalimpong were found in good order. In the Terai no change in the marks was noticed, but apparently it was found impossible, with the establishment at the Subdivisional Officer's disposal, to make a formal inspection of them. I understand that the Deputy Commissioner is about to represent to Government, in a separate communication, the necessity for some addition to the tahsil establishment.

Dinajpur.—In the Maldwar estate 15 pillars are missing and some others have been destroyed by the erosion of the banks of the rivers on which they stood. Of these 14 have been replaced, and action is being taken to replace the rest.

Bogra.—The Collector reports that nothing was done for the maintenance of permanent boundary marks during the year under report, and no explanation is given of the failure to inspect the marks recently erected in the Jaipur Government estates. The inspection of these marks can be carried out in future in connection with the work to be done on the maintenance of the records in these estates.

Dacca Division.

58. *Dacca.*—Permanent boundary marks were inspected by Subdivisional Officers and kanungoes in the course of their tours through the district, and the Collector has submitted a detailed report showing the action taken by him to replace or repair all missing or damaged pillars.

Mymensingh.—Almost all the Government estates have permanent boundary marks at trijunction points, and these were found in good condition. Provision has been made in the budget estimates for 1899-1900 for the erection of further marks where the present ones have been found insufficient.

Faridpur.—Boundary marks in estates under direct management were inspected by the tahsil establishments. No report of their destruction or removal was made to the Collector.

Backerganj.—The permanent boundary marks erected in Government and Court of Wards' estates have been inspected by the Managers and the tahsil establishments, and action has been taken to restore and repair such as were found to have been destroyed or damaged. The masonry trijunction pillars erected in 1862, and the stone prisms put up in the course of the Diara Survey, were inspected by subdivisional and other officers, and it was found that they had been in many cases destroyed or damaged. Steps will be taken to restore or repair them when the survey of the whole district is taken in hand.

Chittagong Division.

59. *Chittagong.*—All the boundary marks are in good order so far as their position in each tahsil circle is known, but the Collector has not as yet received trace maps showing the position of the various trijunction points erected in the course of the recent survey and settlement proceedings. These maps are in course of preparation and the marks will be systematically inspected as soon as they have been completed.

Tippera.—In Government and private estates which have been partitioned no complaint of injury to or loss of boundary marks was received. As to the boundary marks which have been erected in the Sarail and Chakla Roshnabad private estates, the Collector reports that the landlords appear to be indifferent in the matter, and he is inclined to deprecate our taking any trouble to restore or repair them. This matter will be dealt with separately, and the Board will be asked for further orders as to the action to be taken.

Noakhali.—Fourteen pillars were posted on the boundaries of chars Mohara, Mirzamara and Banchanagar. The existing boundary marks were inspected and found in good condition. There are now 264 pillars on the boundaries of Government estates, and careful instructions have been issued by the Collector for their annual inspection.

Patna Division.

60. *Muzaffarpur.*—The boundary marks in Government estates were inspected by the subdivisional officer of Hajipur, who found them in good order, with the exception of a few which had been washed away. In this subdivision and in Sitamarhi some marks have been washed away by floods, and some have sunk underground. One chaukidar was fined for neglecting to report a case of damage. A certain amount of inspection was done of the boundary marks erected in the course of the recent survey of the whole district, but little can be done in this way until definite rules have been laid down for the inspection and maintenance of these marks by village officers.

Saran.—The inspection of the trijunction marks erected during the present settlement operations has been suspended pending the receipt of rules for the work and maps showing the position of these marks. The boundary pillars between Saran and Ballia, in the North-West Provinces, were inspected, and many of them being found in a dilapidated condition are now being repaired. In the Hathwa villages the boundary marks were inspected by the village patwaris, from whose reports it has been found that some 25 or 30 pillars were lost or damaged during the year. These are now being replaced or repaired.

Gaya.—Inspections are being regularly made of the permanent boundary marks erected in Government and wards' estates in this district, and enquiries are being instituted in certain cases in which pillars appear to have been fraudulently removed.

Shahabad.—The Collector reports that his predecessor's careful instructions for the periodical inspection of permanent boundary marks have been ignored, and that he has had to issue fresh orders on the subject. Two stone pillars were restored on the boundaries of the Champ Government estate, 20 were erected on the boundaries of the Camp Dehri Government estate. Two more are to be erected on the boundary line between Kachnar and Banskati.

Champaran.—Permanent boundary marks were inspected by the managers of the Bettiah estate and of a large number of indigo factories, with the result that in the majority of villages they were found in good order. In some villages the marks had been washed away by the floods of September last.

Darbhanga.—Permanent survey marks were inspected in the Sadar and Samastipur subdivisions by the tahsildars and managers of wards' estates, the kanungo and the Subdivisional Officer of Samastipur. In the Sadar subdivision marks were inspected in 139 villages and found in good condition. In the Samastipur subdivision the seven pillars on the western boundary of the Pusa estate were found in a dilapidated state, but action is being taken to replace or repair them. No inspection of boundary marks was made in the Madhubani subdivision, and the Collector is enquiring as to the reasons for this omission.

Patna.—There are no permanent boundary marks, and the Collector remarks "the necessity of demarcating the boundary of every Government village and of keeping permanent marks thereon is great, as encroachment has occurred in almost every village, and Government land has been absorbed in contiguous villages that belong to private individuals." He intimates his intention shortly to submit an application for an establishment to carry out this demarcation work during the next cold weather.

Bhagalpur Division.

61. *Bhagalpur.*—The permanent boundary marks round the Tintanga Government estate were inspected and will be repaired where necessary.

Purnea.—The repairs of the existing pillars in estate Belwa Harinkhuri will be taken in hand after the completion of the current settlement operations.

Malda.—The boundary pillars in Government estates Shergher Panchanandpur and Jhaubuna Kakribadha were inspected several times in the course of the year and were found in good condition.

The Sonthal Parganas.—The only Government estate of considerable extent is the Damin-i-Koh. It was never regularly surveyed and consequently has no permanent survey marks. The village boundary marks erected during the last settlement operations are looked after by the village officials, and are inspected by the Subdivisional Officers as far as it is possible for them to spare time for the work. This tract will be taken up for regular survey during next cold weather, and permanent boundary marks will be erected and maintained at village trijunction points. Elsewhere the boundary marks are reported to be in good order, except in the Sarawan *ghatwali* estate in the Deoghur subdivision, where they appear to have been neglected. The whole of the estate will probably come under the management of the Court of Wards before long, when opportunity will be taken to restore the marks lost or damaged.

Monghyr.—The Collector reports that it has not been ascertained that any permanent survey marks have been injured or destroyed, except such as have been diluviated here and there by the Ganges, and that, in most of the Government estates, no permanent marks exist. Nothing has been said as to the condition of the boundary marks erected in the Narhan Ward's estate recently surveyed and settled, but as the whole of the Monghyr district lying to the north of the river Ganges is to be taken up for regular survey within the next few years, those marks can be dealt with then, together with the permanent boundary marks which will be erected at all trijunction points throughout that area.

Chota Nagpur Division.

62. *Manbhum.*—The Deputy Commissioner reports that the trijunction boundary pillars in estates Mahta and Kailapal were not inspected during the year. It is not explained why they were not inspected.

Hazaribagh.—In the Sarkari Hata estate the work of reconstructing and repairing the masonry pillars was completed, and all the permanent boundary marks are now in good order. Of the 84 pillars in estate Kharakdiha, 27, which had been destroyed, were reconstructed at a cost of Rs. 81. In the Dhanwar Court of Wards' estate the pillars were found in good order.

Singhbhum.—No permanent boundary marks were erected to mark trijunction stations during the last Kolhan settlement. Seventy-seven pillars were erected on the boundary line between Mourbhanj and Singhbhum, and 9 between Keonjhur and Singhbhum, in the course of the year. The boundary marks on these boundaries were duly inspected by the local officials, and in the only case in which a stone had been removed three persons were prosecuted and convicted.

Palamau.—No reports of injury to, or removal of, marks were received during the year from the tahsildars, chaukidars and *baigas* who were directed to inspect and to report on their condition.

The question of the erection, inspection and maintenance of boundary marks in this district has recently been the subject of a special report to the Board.

Ranchi.—The boundary marks were inspected by various officers in different villages and were found in good repair and in their proper places in all villages but one, in which the marks were missing. Action is being taken to replace these missing marks at an early date.

Orissa Division.

63. *Cuttack.*—The Collector reports that nothing could be done in the way of inspection of permanent boundary marks owing to the want of maps showing

their position and of a list of the marks. Action is being taken to supply these wants, and general rules for the inspection of these marks throughout Orissa will shortly be proposed in connection with the new thana maps, for the preparation of which sanction has already been asked.

Puri.—In the Sadar subdivision 54 boundary pillars were found damaged, of which 20 have been repaired. The rest will be dealt with as early as practicable. Further inspection will be carried out in the current year, and maps showing the trijunctional boundary marks, with lists of those marks, will be supplied to the Collector as soon as possible. In the Khurda subdivision the sarbarahkars of the Government estate, which occupies almost the whole of the subdivision, are inspecting the permanent boundary marks, and arrangements are being made to repair such as have been damaged.

Angul.—Eighteen hundred and thirty-nine masonry pillars and 4,948 boundary marks of other descriptions were inspected. Of the former 353 had been destroyed or removed, and 347 were found to have been damaged, while of the latter 1,720 had been destroyed or damaged. Action is being taken to have all these marks replaced or repaired by the tenants under the supervision of the sarbarahkars.

Balasore.—It is reported that the permanent boundary marks were regularly inspected by local officials, who submitted periodical reports to the District Officer. Four lost or damaged marks have been replaced by fresh ones. Of these four marks, it was suspected that one had been stolen, but a thorough enquiry did not lead to the discovery of the guilty person.

CHAPTER III.

UTILISATION OF LAND RECORDS.

64. In previous reports this chapter has been left blank, on the ground that in the scheme of the Government of India it was to be reserved for a description of the work of a land records staff, and the maintenance of circle note-books and the like. But while we have neither land records staff nor circle note-books in Bengal, it should not be supposed that our land records are made no use of for general administrative purposes, or even for the objects for which the land records staff and note-books are maintained in other Provinces. During the late famine in North Bihar the Settlement Officer was able to afford to the Commissioner of the Patna Division, and to Government, statistical aid of much value, and indicated from his records with noticeable facility the areas in which the greatest pressure was to be anticipated, and those in which the people were fairly well off. It is now in contemplation to prepare special maps of the area covered by each thana, in all districts under cadastral survey, on a conveniently small scale, with index lists of villages attached, and to compile at the same time volumes of statistics for each thana which will afford information in an easily accessible form concerning the extent of cultivation, the population, the crops, the agricultural stock, and the rental of each village within it. In Orissa, where the greater portion of the three districts of the Province is temporarily settled, the assessment reports which have been prepared for every pargana in the course of the present settlement operations contain complete information as to the liability of each tract of the country to drought or flood, the fertility of the soil and the profit derivable from the land by its cultivators, and these reports, in combination with the thana registers, will afford a clear guide for the Collector in dealing with reports and applications on the subject of abandonments, resettlements, or remissions of revenue.

The records prepared in Government and Wards' estates are also being fully utilised in order that the rent-rolls of those estates may be accurately maintained, and the existing local *tahsil* establishments are being taught by means of them a more accurate knowledge of the agricultural conditions of the country in which they serve.

The land records are also being utilised to assist in the preparation of crop forecasts and agricultural statistics, and are already proving of much value to district officers for this purpose.

CHAPTER IV.

SCIENTIFIC AND NATIONAL ENQUIRY UNDER IMPERIAL CONTROL.

Botanical examination of various leguminous crops.

65 As reported in paragraph 32 of last year's report, the botanical examination of various leguminous crops was taken up by Major Prain, I.M.S., Superintendent of the Royal Botanic Gardens, in the course of the year 1897-98. This examination was completed during the past year, but the Superintendent has not yet found time to submit his report of the results attained. Major Prain hopes that either he or his Assistant, Lieutenant Gage, I.M.S., may be able to take up the examination of some fresh family, possibly the gourd family (*Cucurbitaceæ*), in the course of the current year.

Sola (Æschynomene Indica).

66. The botanical examination by the Reporter on Economic Products to the Government of India of all the varieties of *sola* to be found in the different districts of the Bengal Presidency, commenced last year and referred to in my last report, is still in progress, and specimens of the *Æschynomene Indica* and other pith-yielding plants are still being collected by the Assistant Directors and Travelling Overseers of this Department and by District Officers.

Betel-leaf (Piper betel, pán).

67. Considerable progress has been made in the course of the year in the enquiries as to the cultivation of *pán* (*Piper betel*), and a large number of specimens of the leaf have been forwarded to Dr. George Watt, C.I.E., Reporter on Economic Products, who is gradually working up the materials that have been collected into a note on the subject. Babu Nibaran Chandra Chaudhuri, Travelling Overseer of this Department, who has devoted much attention to this subject, has submitted a careful note on the cultivation of this crop in the Backerganj district, and has revised and amplified his previous note on the varieties of *pán* to be found in Jalpaiguri. Further enquiries are being made, and specimens of all varieties in flower and fruit will be collected if possible in the course of the present year.

Betel-nut Plague in East Bengal.

68. This disease has not re-appeared during the past year. The report on the subject of the last outbreak of this plague, which is under preparation by Dr. Watt, has not yet been completed.

Sugarcane Disease (Trichosphæria Sacchari).

69. The Government of India having asked for a report on the extent of the occurrence of the above disease in these Provinces, on the remedial measures adopted, and the degree of success which had attended them, enquiries were instituted on the subject in January of the current year, and are still in progress. No definite results have yet been arrived at, but the indications are that the sugarcane crop in Bengal is not at present very seriously affected by any disease of this kind, and that the cultivator has not yet, in consequence, paid much attention to it. The experts hitherto consulted on the subject, to whom specimens of diseased canes have been submitted, have given opinions which vary on material points, two officers detecting the presence of *trichosphœria sacchari* in its earlier stages before fructification, in a large number of the canes, while a third officer declares himself unable to find proof of the presence of this disease in the same canes. On the other hand, the examination of the canes has supplied evidence of considerable damage done by the borer insect (*Hyleborus sp.*) followed by white-ants, and by a borer moth, said to be a species of *chilo*. I have submitted a separate intermediate report on this subject to Government, and hope soon to be able to complete my enquiries.

Enquiry regarding the effects of the increasing imports of refined sugar on the cultivation of sugarcane and the profits of the Indian sugar industry.

70. At the close of November, 1898, I received a letter from the Government of India, through the Government of Bengal, asking that certain enquiries might be made as to the effect of the competition of imported sugars on the sugarcane industry of Bengal. These enquiries were duly instituted, and the district officers of 27 districts were communicated with, while reports were also asked for from several firms interested in the sugar industry, and from the officers of the Settlement Department working in North Bihar. The subject was also investigated and reported upon by the Assistant Directors of the Department, the Travelling Overseers, and the Managers of our experimental farms. The results of these enquiries were reported to Government in my letters Nos. 971A. and 4T.A., dated 14th March, 1899 and 24th April, 1899 respectively. The conclusions come to by me on the evidence thus procured were—

(1) That the importation of foreign sugars has greatly reduced the price of refined sugars in the Indian market.
(2) That the Indian sugar-refining industry has been practically ruined by this reduction in price, that a large number of refineries have been closed, and that the remaining ones are mostly working at a loss.
(3) That the price of unrefined sugars, known as *gur* and *ráb*, has not on the whole fallen.
(4) That, mainly on account of the demand for raw sugar, the area under sugarcane cultivation and the profits derived from that cultivation have not diminished in the past few years.

Juár (*Sorghum*).

71. This crop was taken up for investigation during the past year in connection with the Imperial Institute collections, and notes as to the cultivation of different varieties of it, with botanical specimens of each, were submitted by several District Officers direct to the Reporter on Economic Products in the course of the year. An interesting note on this crop was received by Dr. Watt from Babu Krishna Lal Dey, through the Collector of Saran, while the Collector of Muzaffarpur sent up a series of valuable notes, with specimens, submitted to him by his kanungo, Babu Bireshvar Sanyal.

Jute.

72. Some enquiries have been made in the course of the year as to the reason why the jute grown in the district of Backerganj is usually found to be discoloured and of less value than the jute obtainable in the markets of Serajganj and Narainganj. As there appeared to be grounds for supposing that this inferiority was due to some difference in the water in which the jute of these localities was steeped, specimens of the water ordinarily used for this purpose in different districts have been obtained for the purpose of analysis, and the investigations in this direction have not yet been completed. At the same time, Dr. Watt has analysed some specimens of jute in which the discoloration objected to had been observed, and has found reason to believe that it is due to the development of tannin in the mature plant, which has brought about the formation of a kind of ink (tannate of iron) by the action of the tannic acid reacting with ferruginous matter in the water. The suggestion thus made will be further followed up. Action has been taken, in connection with the enquiries made, to obtain complete botanical specimens of *Corchorus Capsularis* and *Corchorus olitorius*, with specimens of the fibre obtained from them, for the Indian Museum, and to commence the collection of specimens of all the various kinds of jute grown in Bengal, in order to provide material eventually for an exhaustive investigation into the races of this plant.

Ál (*Morinda Tinctoria*).

73. In consequence of a discovery made by Dr. Watt in the year 1897, that the plant from which the *Ál* dye was derived in the district of Dinajpur was *Morinda Angustifolia* and not *Morinda Tinctoria*, and that this plant was

propagated by root and not by stem-cuttings, some further enquiries were made in the course of the year as to the species of *Morinda* grown in Muzaffarpur, and the area covered by this crop in that district. It was found that some 700 acres of *Morinda Tinctoria* were grown in Muzaffarpur, and that the crop was grown from seed, and some interesting information as to the cultivation and use of the crop was obtained. It is proposed to make further enquiries during the present year as to the cultivation of this crop in other districts of the Province.

Chemical analyses of Soils by Dr. J. Walter Leather, Assistant Agricultural Chemist to the Government of India.

74. On the invitation of the Agricultural Chemist to the Government of India specimens of soils from Backerganj, Chittagong, Kalkini in Faridpur, and Dhenkanal and Khurda in Orissa have been submitted to Dr. Leather for chemical analysis in the course of the year. Some of these soils have been taken from lands set apart for experimental or demonstration farms, while others have been selected on account of the peculiar qualities exhibited by the crops found growing on them. The results of the analysis made of these soils will be utilised in due course, when a sufficient number of specimens have been dealt with, and comparative figures have thus been made available.

Saline efflorescence or Reh in North Bihar.

75. This subject has been further investigated during the past year, and specimens of the soils in which this efflorescence has been observed have been collected and forwarded to Dr. Leather for analysis. The recent agricultural history of the lands from which the specimens have been obtained has at the same time been noted. Information as to the results of the analysis made has not as yet been received in all cases, and correspondence and the collection of specimens are still in progress. It is hoped that materials will be completed in the course of the present year for a full report on the subject, and that it may be found possible eventually to prescribe some treatment, founded on that long since adopted with success in the North-Western Provinces, which will serve to enhance the value of these lands to the agricultural population of Bihar.

Enquiry regarding the supposed injurious effects of well irrigation in certain tracts in North Bihar.

76. An enquiry which was initiated in the year 1896-97 regarding the injurious effects which were reported to result from well irrigation in certain tracts in North Bihar, where indigo-planters and raiyats alike objected to resort to it for their crops, was continued during the year under report. The Collectors of Darbhanga, Muzaffarpur, and Champaran were requested to cause enquiries to be made within their respective districts with the object of marking out definite areas within which the raiyats objected to the use of well water for irrigation. From Darbhanga and Muzaffarpur it has been reported that no prejudice exists against the use of well water for irrigation. In Champaran, however, the prejudice seems to be widespread, and appears to be due to two causes—(1) the well-known effect of irrigation in bringing salts to the surface, where the soil is impregnated with them, and (2) a widely prevalent idea that certain soils in which clay is mixed with sand will always require irrigation in future, if irrigation is once resorted to. It will be noticed that neither of these objections has any connection with well water as opposed to other water, and that the first is one that has been frequently investigated before, and is consequently well understood. The second objection is, however, less known, and has been pressed strongly by Mr. D. J. Macpherson, I.C.S., C.I.E., lately Collector of the district, who has paid much attention to the subject. Mr. Macpherson informs me that the opinion referred to is held by many gentlemen of experience among the planters of Champaran, and he suggests that irrigation may effect some change in the mechanical texture of the soil alluded to, which renders it less retentive of moisture. The subject is receiving my careful consideration, and arrangements are being made to

test by experiment on the field and in the laboratory whether any such change as that suggested does actually occur as a result of irrigation. Further samples of soil and water have been collected from the affected tracts and have been forwarded for chemical analysis to Dr. Leather, Assistant Agricultural Chemist to the Government of India, whose advice has been asked for in the matter of the experiments to be carried out.

Cultivation of Rhea in Bengal.

77. The revised edition of the Agricultural Ledger on Rhea, referred to in paragraph 38 of my report for 1897-98, was published by the Reporter on Economic Products in the course of the year, and contains all the information obtained by Dr. Watt in the course of the extensive tour made by him in Eastern Bengal in 1897. Seed and roots of the true Rhea, (*Bœhmeria Nivea*) are being distributed annually in considerable quantities through the agency of the Superintendent of the Botanic Gardens and the Agri-Horticultural Society of India, and some attention is being now paid to the *Ban* rhea of Assam (*Villebrunea Integrifolia*), a tree which is found wild in the hills and low valleys of that Province, and in Sikkim, Burma, and Chittagong, and which it is believed that it may prove profitable to cultivate. In Agricultural Ledger No. 3 of 1899 a very favourable account is given of the fibre obtainable from the *Ban* rhea, and it is pointed out that as the fibre can be cleaned by a simple process of 'retting,' the decorticating and degumming machinery used for the cleaning of the fibre of *Bœhmeria Nivea* is not required, and the cost of production is accordingly considerably reduced.

An experiment with rhea in the district of Pabna was referred to in paragraph 50 of my annual report for the year ending March 31st, 1898. This experiment was conducted on a very small scale and led to no definite result. The waterlogged soil and the general agricultural condititions of the Pabna District would appear to be unfavourable to the growth of rhea.

Collection of articles for the Indian Museum and the Imperial Institute, London.

78. During the year under report 63 specimens of economic products were collected by this Department, through its travelling overseers, for the Imperial Institute, London, and were forwarded to the Reporter on Economic Products to the Government of India. The cost of making these collections amounted to Rs. 245-4-3. A list of the products of which specimens were collected is appended to this report.

Bengal Veterinary Department—Cattle-breeding.

79. The work of the Civil Veterinary Department has been fully reported on by Veterinary-Major Raymond, the Superintendent, and his report has been submitted to Government separately The account given in it of the action taken by this Department for the improvement of the breed of cattle in Bengal need not be repeated here. Unexpected difficulties have been encountered in our efforts to procure bulls suitable for the cows of these Provinces, and it seems unlikely that any considerable improvement can be effected until the Department has been placed in a position, by the opening of one at least of the cattle-breeding farms now in contemplation, to breed its own bulls.

CHAPTER V.

SCIENTIFIC AND LOCAL ENQUIRY UNDER PROVINCIAL DIRECTION.

Analysis of districts.

80. In the report for the year 1897-98 I stated that it had not been found possible to commence the preparation of an analysis of the Shahabad district, and in the Resolution on that report His Honor the Lieutenant-Governor expressed a hope that the work might be taken in hand during the year then current. I regret to report that it has again been found quite impossible to spare either of my Assistant Directors for the commencement

of this very considerable task. The last analysis prepared by an Assistant Director was in the year 1890-91, and the work of this office has enormously increased since then, while no addition has been made to the strength of my staff. In a subsequent paragraph I have ventured to lay before Government some further information as to the development of the work of the Agricultural side of my office, and I fear it would be impossible for me to spare either of my Assistants for the preparation of an analysis of a fresh district at any time in the near future, without serious detriment to the current work of the Department.

Experimental Farms.

81. The following brief accounts of the work done at the three experimental farms maintained in Bengal are taken from the annual reports of those farms, which will be separately published. It has been thought unnecessary to repeat here the detailed results of the experiments carried out during the year, all of which will be found in those reports. Mr. N. G. Mukherji, Agricultural Lecturer at the Sibpur College, was in charge of the Sibpur Farm, Mr. N. N. Banerjei was in charge of the one at Dumraon, while Mr. D. L. Roy supervised the work of the farm at Burdwan.

The Sibpur Farm.

82. This farm was worked in connection with the two Agricultural classes established last year. The higher class reserved for University graduates and candidates of similar educational qualifications had 11 students, and the lower class, which was open to Sub-Overseers passing out of the Apprentice Department of the Engineering College, had only two students. During the session each student did practical work in the farm, and acquired a varied experience in working improved farm implements and machinery, and in the study of different methods of cultivation.

The work of the farm during the year may be divided under the following heads:—

(1) Experiments with new and improved implements;
(2) Experiments with different manures;
(3) Experiments in methods of cultivation;
(4) Experiments with new crops and new varieties of existing crops and
(5) Distribution of seeds and implements.

(1) *Experiments with new and improved implements.*—Under this head Mr. Mukherji reports that he finds that the Meston plough, which is said to be adapted for the light soil of the Cawnpore Experimental Farm, is not so suitable for the heavy soil of Sibpur, and for heavier classes of soil he gives preference to the Sibpur plough among all the improved ploughs he has seen This plough is, however, more costly and heavier to draw than most ordinary country ploughs, and it seems doubtful whether its advantages counterbalance these drawbacks. The *Bakhar* imported from Southern India has proved useful, and it has been found possible to use the following European implements with ordinary Bengal bullocks with considerable success: (*a*) a light plough, (*b*) a ridging plough, (*c*) a fine-tined grubber or scarifier, and (*d*) an ordinary English harrow with one of the three sections removed.

(2) Manure experiments have never given very decisive results in this farm, but an experiment with *mahua* cake for paddy gave a very noticeable increase in the outturn of that crop; the experiment will be repeated in the present and in succeeding years, as it is possible that it may prove profitable to use this cheap oilcake for paddy, although it does not ordinarily pay to use oilcake for this crop.

(3) *Methods of cultivation.*—*Arahar*, maize and *juár* were grown together as a mixed crop during the year. The *juár* did well, but the other two crops gave poor results. The experiment will be repeated.

The trial of deep *versus* shallow ploughing gave no results of interest, there being no perceptible difference in the outturn in each case.

The proper time for cutting jute was made the subject of another experiment, and it was found that the heaviest outturn was obtained from plants cut while in full flower.

The necessity for steeping jute in stagnant water was also indicated by the results of another experiment. The stalks steeped in running water took nearly two months rotting, and the fibre obtained was dirty in colour. The result is interesting in connection with the enquiries to which reference is made in paragraph 72 above. These experiments with jute will be repeated.

The value of *ratooning khari* sugarcane was again demonstrated during the year, though the outturn from all the plots was low, owing to the crop having been left unirrigated too long.

(4) *New crops or new varieties of existing crops.*—The following crops grown successfully at the farm during the year deserve special mention:—(*a*) a fine variety of *aus* paddy, the seed of which Mr. Mukherji procured in the Central Provinces; (*b*) ordinary South Indian *judr* or *cholam* grown as a fodder crop; (*c*) Kábul gram; (*d*) *Hibiscus cannabinensis;* (*e*) *Cassáva*, and (*f*) an African yam. The success obtained with these crops has encouraged Mr. Mukherji to cultivate them on a larger and more practical scale this year.

(5) *Distribution of seeds and implements.*—There has been some increase in the work under this head, which has never, however, been very extensive. More paddy and tobacco seeds, Guinea grass roots and Sibpur ploughs were sold during the year than in previous years, but the quantities were only $1\frac{1}{2}$ maunds of paddy seed, $111\frac{1}{2}$ tolas of tobacco seed, 2 maunds of Guinea grass roots and 17 Sibpur ploughs. Some 1,100 *Cassáva* cuttings were also sent to different districts, and $1\frac{1}{2}$ maunds of mulberry cuttings.

Receipts and expenditure.—The receipts during the year came to Rs. 1,204-13, against Rs. 1,100-9-9 and Rs. 1,005-7-9 in the two previous years. The expenditure amounted to Rs. 3,497-11-7, against Rs. 3,159-3-9 and Rs. 3,917-11-4 during the previous two years. The receipts from the *rabi* crops, which did not do very well, fell off considerably during the year, but the good crops obtained during the previous *bhadoi* season more than made up for this deficiency.

The Burdwan Farm.

83. Experiments were continued last year in the Burdwan Farm with seeds, manures and implements.

(1) *Experiments with manures.*—These experiments were designed to test the effects of different manures on paddy, sugarcane, jute and potatoes.

(*i*) An experiment was made in duplicate with the object of testing the manurial value for paddy of the following manures—cowdung, castor cake, bonemeal, and a mixture of bonemeal and saltpetre. Both the series pointed to the superior manurial value of a mixture of bonemeal and saltpetre. Bonemeal gave the next best results. Cowdung at the rate of 50 maunds per acre also proved to be an excellent manure for paddy, and in the second series gave the best financial results. Another experiment was made with paddy to test the value of green manuring, as compared with ordinary cowdung manure. The crop used as green manure was jute, which was ploughed in when 1 foot high. The green manuring gave, as usual, the largest outturn of grain, whilst the cowdung produced the heaviest yield of straw.

(*ii*) An experiment was made to compare the effects on the local *shamshara* variety of sugarcane of the following manures—cowdung, bonemeal, cowdung and bonemeal, cowdung and *super*. This experiment has been conducted for three years now, but the results obtained hitherto have not been altogether consistent, and the experiment will be repeated.

(*iii*) The effects of different manures, viz., cowdung, castor-cake, bonemeal, and a mixture of bonemeal and saltpetre, were tried on Sirajganj jute. Cowdung gave, as before, the largest outturn of fibre. The experiment was started in 1889-90. The superior manurial value of cowdung over other manures for jute has now been demonstrated for ten successive years.

(*iv*) Experiments were made to contrast the effects of cowdung, castor-cake and bonemeal on the Naini Tal potato. Castor-cake gave the heaviest outturn, as in the two preceding years.

(*v*) Another experiment was made with potatoes to test the manurial value of cowdung conserved in *pakka* covered pits, as compared with that of cowdung purchased from the raiyats. The results obtained hitherto point to the superiority of the pitted cowdung.

(2) *Trials with implements.*—The improved implements tried on the farm were (*i*) Sibpur plough; (*ii*) Watt's chain plough; (*iii*) Baldeo plough; (*iv*) Meston plough; (*v*) Martin's plough; (*vi*) American hoe; (*vii*) Behea sugarcane crushing mill; and (*viii*) Behea shallow pan for boiling sugarcane juice.

As in previous years the Sibpur plough gave a larger outturn of paddy than the country plough, especially in the plots manured with saltpetre. The other "improved ploughs" did not give satisfaction. The American hoe was found useful in hoeing potato-fields, and the Behea mill and pan proved, as usual, decidedly superior to the country ones, and continue to earn the approval of the neighbouring cultivators.

(3) *Experiments in methods of cultivation.*—Experiments were made under this head with paddy, sugarcane, and potatoes.

(*i*) An experiment was made to ascertain the merits of thick sowing of paddy seeds as compared with thin sowing. No decided difference in results was observed. Another experiment in duplicate was made with paddy to test the value of selecting seeds. The outturn from selected seed was, as usual, slightly better than that of the crop raised from seed not selected.

(*ii*) With sugarcane an experiment was made to contrast the country system of planting in shallow lines with the system of planting in trenches. The results indicated, as in several previous years, the superiority of the latter method. Another experiment was conducted to contrast the result of planting cane-cuttings with that of planting the tops of canes. The system of planting cane-cuttings gave a better result. The *ratooning* of *Khari* sugarcane was again successfully tried and proved highly remunerative. Another experiment started in the year under report was designed to ascertain the effects of binding *Khari* sugarcane with their leaves. This method resulted in a large increase in the outturn of *gur*.

(*iii*) An experiment was made with the Naini Tal potato to compare the relative merits of planting whole tubers and of planting cut sets. It proved, for the fourth time in this farm, that for the same weight of seed the cut sets yielded a decidedly better outturn.

(4) *Experiment with new crops and varieties of crops.*—Experiments were conducted under this head with paddy, sugarcane, maize, *sorghum* and potatoes.

(*i*) The same six varieties of paddy were tried as before. The *Bansmati* paddy proved to be the best cropper, and *Kartic Shawl* the next best, as in previous years. The *Jetha Kalma* variety gave good results, as before.

(*ii*) Four varieties of sugarcane, viz., *Shamshara*, *Poona*, *Kajli* and *Puri*, were tried last year. The local *Shamshara* variety yielded, as usual, the best, and *Puri* the poorest, outturn of jaggery. There was little perceptible difference in the outturn of the other two varieties.

(*iii*) The Naini Tal variety of potato was contrasted with the *Amragachi* (Patna) variety. The produce obtained from the same quantity of seed was in the latter case nearly double that obtained from the Naini Tal variety. Attempts are being made to introduce the Patna variety, which is of a fair size and a heavy cropper, into districts where the cultivation of potato has hitherto been unknown. The Naini Tal is, no doubt, a better variety of potato and fetches a high price for its superior size and flavour, but it suffers from the serious drawback that its seeds cannot be locally preserved. Attempts have been made by this Department to preserve these potatoes for seed, but have hitherto failed.

(*iv*) Two varieties of *sorghum* were tried, viz., the red-seeded and the black-seeded. The latter gave the best outturn, as last year.

(*v*) The experiments with maize did not give reliable results.

(5) *Conservation of cowdung.*—Cowdung was conserved in *pakka* pits. The six plough-bullocks of the farm gave during the year under report 36,128 lbs. of solid and 1,303 lbs. of liquid manure. The experiment showed that an average-sized bullock properly housed and fed would give not less than 75 maunds of farm-yard manure in a year.

The work of distribution of seeds to the neighbouring cultivators was continued.

The receipts of the farm for the year amounted to Rs. 1,182-2, against Rs. 1,181-0-3 in the previous year, and the expenditure was Rs. 2,359-5-6 against Rs. 2,539-6-9.

The Dumraon Farm.

84. The experiments of previous years were continued during the year under report at the Dumraon Farm. The character of the season was, on the whole, favourable. The *ahar* (water reservoir), which was completed during the year, proved very useful for irrigating the paddy crops. Rust appeared in the cold weather and damaged wheat and barley to some extent. It was chiefly the "Muzaffarpur rust" as identified by Dr. Prain. "Sibpur rust" appeared in some plots. Under the instructions of the Government of India samples of grain attacked by the first kind of rust have been collected for despatch to Mr. Farrer of New South Wales.

(1) *Experiments with manures.*—The crops experimented with were paddy and wheat:—

(*a*) In 1897-98, the manures used for the paddy crops were cowdung, ashes of cowdung and bonemeal. During the year under report, the following manures were added:—castor-cake, cow dung and castor-cake, ashes of cowdung and saltpetre, bonemeal and saltpetre. Castor-cake gave the best results (2,510 lbs. of grain per acre); next in manurial value came ashes of cowdung and saltpetre (2,475 lbs. per acre), and then cowdung and castor-cake (2,315 lbs. per acre). All the other manures except bonemeal yielded an outturn of grain slightly above 2,000 lbs. per acre, while the outturn of the unmanured plot was only 1,020 lbs. per acre. The cost of all these manures was sufficiently recouped by the increase in outturn. The yield of paddy manured with bonemeal, which proved unremunerative, amounted only to 1,695 lbs. per acre. The outturn of all the plots was in excess of the corresponding outturn of last year.

(*b*) The manures tested on irrigated wheat were the same as in previous years, viz., cowdung, ashes of cowdung, ashes of cowdung and saltpetre, bonemeal, town sweepings and green manures. Cowdung maintained its reputation and yielded an outturn of 1,505 lbs. per acre. A nominal increase, however, of 5 lbs. per acre on this amount was obtained from each of the plots to which ashes of cowdung and saltpetre and town sweepings were applied. All these three manures raised the crop more than three-fold, the average outturn of grain per acre of the unmanured plots amounting only to 412 lbs. per acre. Bonemeal and ashes of cowdung gave about equal results, raising the outturn of the unmanured plots a little above twofold. Green manures as usual gave bad results, showing only a nominal increase of 150 lbs. of grain per acre over the outturn of the plots not manured.

(*c*) The result of the manure experiment with unirrigated wheat corroborated the experience of the previous three years, that when wheat land is unirrigated, very little benefit can be obtained by manuring with cowdung. The average increase in the outturn of grain due to manuring during four years has been only 95 lbs. per acre.

(2) *Trials with new and improved agricultural appliances.*—The implements tried were the Sibpur plough, Martin's plough, and the Meston plough.

The trials made with the Sibpur plough confirm the opinion already expressed, that while it gives good results on wheat lands, it is unsuitable for paddy lands. The great advantage in it is that it inverts the soil, and in the case of a crop which admits of such inverted soil being exposed to the effects of sun and rain for a considerable time, the results obtained are good. The

Sibpur plough has always been found very useful in breaking up new land. The country plough does its own work of grubbing very usefully, but it is not a soil-inverting implement. The Martin's plough could not be worked successfully on the farm. It was found that the furrows made by it were irregular, especially on fallow land. The teeth attached to the plough instead of being an advantage were found to offer a great resistance, and thus to make the action of the plough uneven and spasmodic. The mould board appeared to be too abruptly curved, which prevented the plough from inverting the soil properly. The Meston plough was also found rather unsatisfactory at Dumraon. On hard soil, it did little more than scrape the land, and on soft loose soil, it scarcely inverted the soil, and in this respect was not found to be superior to the country plough. The furrows made by it were in all cases shallower and narrower than the furrows made by the local country plough.

(3) *Experiments in methods of cultivation.*—An experiment with Naini Tal potatoes, in which the same number of cut-sets and whole tubers were used for sowing, gave results in favour of the latter method in point of actual outturn, but financial results were in favour of the former method, owing to the much larger quantity of whole tubers required for sowing.

(4) *Experiments with varieties of crops.*—The crops tried under this head were paddy, wheat, potatoes, maize and *bajra*. The latter two crops failed owing to heavy and continuous rain in July and August.

(*a*) *Paddy.*—As in previous years, the local *Bansmati* fine paddy gave slightly better results than the local *Bataspheni* coarse paddy and the Diamond Harbour fine paddy. Dehra Dun paddy proved unsuccessful.

(*b*) *Wheat.*—Only six varieties of wheat were tried during the year, viz., the red and white local (Buxar), the red and white Muzaffarnagar, and the red and white Punjab varieties. The four varieties from the Central Provinces, which were experimented with in previous years, were excluded last year, owing to their great liability to attack by rust. They always gave very poor results and seemed to infect with rust the other varieties which were comparatively immune. Of the six varieties tried, the Buxar white and Muzaffarnagar white proved to be the heaviest producers, and then came in point of productiveness the Buxar red and Punjab white variety. The Muzaffarnagar red and Punjab red varieties were very badly attacked by rust and yielded very poor results.

(*c*) *Potatoes.*—As in the previous two years, the Naini Tal variety gave the heaviest outturn, followed by the local Ghazipur and Bettiah varieties, while the Cherapunji proved the poorest producer.

Besides the above crops, oats, barley, and were grown *juar* successfully.

(5) *Distribution of seed.*—This subject continued to receive attention. *Khari* sugarcane, cuttings of which were purchased by raiyats in previous years from the farm, has quite supplanted the local varieties. A large amount of *Khari* cane cuttings now exchange hands every year among the raiyats round about Dumraon. The Poona sugarcane, which was also first imported for the farm, is now being cultivated by many raiyats. Muzaffarnagar wheat, which was imported for the farm some years ago as a good rust-resisting wheat, is now very generally cultivated by the neighbouring raiyats. Oats grown on the farm were supplied as seed in large quantities to many Government and Wards' estates, where they are reported to have given good results.

(6) *Conservation of manures.*—Cattle-dung and urine were conserved in *kutcha* pits during the year, but funds have since been provided by the Raj for the construction of *pakka* pits for their conservation in future.

(7) *Receipts and expenditure.*—The total expenditure during the year amounted to Rs. 2,657, against Rs. 2,939, the expenditure of the previous year. The receipts amounted to Rs. 941, against Rs. 1,313. The decrease generally on both sides of the balance sheet is due to the abolition of the subsidiary farm at Pareswana, the land of which has now been leased to cultivators. The decrease in receipts is also partially attributable to the low prices of

produce ruling last year as compared with those of the year previous. It is hoped that the balance against the farm will be smaller in the current year.

Agricultural experiments and the introduction of new and improved staples in Government, Wards' and Private estates.

85. A summary is given below of the action taken in various estates to introduce new crops or to improve the varieties of crops already grown. Although the experiments made were in many cases unsuccessful, the negative results were frequently instructive, and more interest was shown in this work generally by the officers responsible for them than in previous years. In many estates, also, attention is being paid to cattle-breeding, and Major Raymond's sustained efforts to introduce fresh blood and improved strains are now meeting with some encouragement. From several quarters proposals have recently been made for the institution of small experimental and demonstration farms, and the demands on this Department for advice, and for working plans and estimates of such undertakings, have largely increased. The present proposals include projects for large cattle-breeding farms at Hatwa in Saran and at Pusa in Darbhanga, and for smaller mixed farms at Tikari in Gaya, in the Jalpaiguri, Chittagong and Angul districts, and also in two or three other places in Orissa. The farms started by Mr. Robindra Nath Tagore at Silidah in the Nadia district, and by Mr. Pál Chaudhuri at Mohesganj in the same district, are making fair progress, and the experimental cultivation conducted by other private gentlemen with our assistance in different parts of the country is being persevered in. The Board of Revenue have recently called the special attention of the Managers of Wards' and Government estates to the Government Resolution of October 1896, and have impressed on them the importance to be attached to the work of agricultural improvement. Both the Assistant Directors of the Department and the two travelling overseers have been constantly on tour throughout the year visiting the various estates and farms in which experimental cultivation is in progress, and have endeavoured, as far as possible in the time at their disposal, to secure that these experiments should be properly carried through.

BURDWAN DIVISION.

86. *Midnapore Government Estates.*—Experiments with potatoes were made in the Doro and Contai circles of the Majnamutha estate. The experiment in Doro proved unprofitable, though the potatoes produced were decidedly superior to those ordinarily exposed for sale. The crop will probably succeed in this pargana, and an attempt will be made to reduce the cost of its cultivation. In the Contai circle the experiment was a failure. The Subdivisional Officer thinks that the soil of the locality is not suitable for this crop and proposes to discontinue the experiment.

Hooghly Government Estates.—In the *khas mahals* of the Jahanabad subdivision the experiment made with potatoes was unsuccessful, owing partly to want of supervision and partly to the use of unsuitable tubers as seed.

Birbhum Government Estate.—Potatoes were cultivated with some success in the Government estate Kushmore in the Rampur Hát subdivision.

PRESIDENCY DIVISION.

87. *24-Parganas—Bhawanipur Ward's Estate.*—The experimental cultivation of potatoes was carried on for the second time. The plants grew vigorously at first, but suffered from blight early in February, and the outturn consequently was poor.

Nadia Government Estates.—Naini Tal potato seed was distributed by the Subdivisional Officer of Chuadanga among some cultivators, who raised the crop according to their own ideas and means. The rain in October destroyed the young shoots in many places, necessitating a resowing, and the experiment can hardly be said to have been successful.

Nadia Private Estates.—Experiments with Naini Tal potatoes were made by Mr. Robindra Nath Tagore in the Tagore estates at Silidah in the

Kushtia subdivision. The crop was not satisfactory owing to defective cultivation. One of Mr. Tagore's tenants, however, working under more favourable circumstances, obtained a bumper crop from a portion of the same seed, and the success of this experiment is said to have induced several neighbouring raiyats to take to potato cultivation. These experiments, together with others introduced by Mr. Tagore on his farm, will be continued.

Another leading zamindar, Mr. B. Pál Chaudhuri, has recently opened a farm in the neighbourhood of Krishnagar and is making successful experiments with various *rabi* crops on the advice of this Department. We have also recently supplied him with tobacco seed, from which an excellent outturn has been obtained, and Mr. Chaudhuri anticipates considerable profit from the cultivation of this crop.

Jessore Government Estates.—The experimental cultivation of the *Shamsara* and *Khari* varieties of sugarcane has been taken in hand in the Char Bani estate in the Magura subdivision.

Murshidabad.—Babu Charu Krishna Mazumdar, zamindar and Honorary Magistrate, made an experiment in the cultivation of potatoes with satisfactory results. He has submitted an interesting report of his experiment in which he shows that the cultivator can fairly expect a profit of Rs. 40 per bigha from the cultivation of potatoes in the eastern part of the Murshidabad district. He also experimented successfully with all sorts of English vegetables, Havannah tobacco, and the tapioca plant, and has promised a report on the subject of his cultivation of the last named plant at a later date.

Khulna.—Babu Rai Churn Bose, Mukhtear, repeated his experiment with the Naini Tal potato during the year and secured a high profit, in spite of damage done by the winter rain.

Rajshahi Division.

88. *Jalpaiguri Government Estates.*—As the Deputy Commissioner of Jalpaiguri was of opinion that the experiments in potato and other seeds had not been very successful in recent years, no seeds were distributed among the *jotedars* during the year under report. The Deputy Commissioner proposes to utilise the funds hitherto expended on the distribution of seed, together with other funds at his disposal, in the establishment of an agricultural and cattle-breeding farm, and plans and estimates for such a farm are now under preparation. A suitable site has been chosen, and a complete scheme for the opening of a small demonstration and breeding farm will be shortly submitted. Ten ounces of *rhea* seed were supplied to the Central Duars Tea Company. The seedlings in the nurseries have not yet been transplanted.

Bogra—Jaipur Government Estates.—An experiment with Buxar wheat failed, owing to the late sowing of the seed, which was mis-sent to Rajputana by the Railway Company. An experiment with Naini Tal potatoes proved very successful, the outturn and quality of the produce being much superior to that obtained from the local variety.

Dinajpur and Rangpur Wards' Estates.—The cultivation of Naini Tal potatoes was tried with a fair amount of success by the tenants of the Maldwar estate in Dinajpur, and the Hazrahati Tepa and Rahmatpur estates in Rangpur. Dumraon wheat and certain country vegetables were also successfully grown by the tenants of the estates in Rangpur.

Dacca Division.

89. *Faridpur Government and Wards' Estates.*—The experiment with Naini Tal potatoes, both in the Government and Wards' estates in this district, proved a decided success, but those conducted with Buxar wheat and English vegetables failed, owing to late sowing. The cultivation of tobacco is reported also to have failed.

Backerganj Government and Wards' Estates.—The results of the experiments with Naini Tal potato seed in the Government and Dakhin Shahbazpur Wards' estates were not encouraging, though the quality of the produce obtained in Dakhin Shahbazpur was excellent. Tobacco was also successfully cultivated in the Dakhin Shahbazpur estate. But the raiyats could not be induced to adopt

its cultivation, as they are reported by the Manager to be quite satisfied with their excellent crops of paddy, which are raised by them with less labour. The Collector of Backergunge is, however, more hopeful, and proposes to continue the experiments.

Chittagong Division.

90. *Chittagong Government Estates.*—Experiments were made in these estates with potatoes, Dumraon peas, Midnapore radishes, and *patal.* The outturn of potatoes, though not especially good, has, it is reported, done something to remove the prejudice of the local cultivators against its cultivation, and the trial has been a fair success. The Midnapore radish grown was found to taste better, but to be inferior in size to the native variety.

The cultivation of Dumraon peas proved successful only in the garden of the Patiya estate office, where it yielded a luxuriant crop. In Patiya experiments were also made with a fair amount of success in *Kamini dhan*, maize, *shankaloo*, brinjals, carrot, cabbages, etc., the cultivation of cabbages being very satisfactory.

Chittagong Wards' Estates.—Owing to the want of sufficient funds to the credit of these estates, experiments could not be carried out on a large scale. The cultivation of the two chief crops, viz., potatoes and tobacco, was not successful, owing to the use of defective seed. Some English vegetables were cultivated with satisfactory results. The cultivation of Nadia chillies and *sonpath* (hemp) in the estates of Fazal Ali Khan, failed through want of seasonable rain.

Noakhali Government Estates.—*Khari* sugarcane was cultivated in the Sadar subdivision. The soil of the district seems to be well suited to the cultivation of sugarcane, but the cultivators have not as yet taken advantage of the fact. The cultivation of potatoes was not successful. The plants were attacked by insects and dried up early. Peas, gram and oats were also tried, but the crops were destroyed by insects.

Noakhali Wards' Estates.—The experiment made in the cultivation of potatoes in the estate Bharat Chandra Saha was fairly successful. A kind of insect pest, locally called *leda poka*, attacked the plants and did much injury. The Manager was asked to send specimens of the insect to the Superintendent of the Indian Museum for identification, but it had disappeared before the orders were received by the Manager. Experiments in Muzaffarnagar wheat were unsuccessful. Gram was cultivated with a fair amount of success.

Tippera Government Estates.—Sugarcane was experimentally cultivated in Char Hime, but the results have not been fully reported.

Patna Division.

91. *Patna Government Estates.*—Potatoes were experimentally cultivated, but with little success, owing to late sowing and excessive rain in some cases, and in others to the soil proving unsuitable for potato cultivation.

Wards' Estates in Patna.—The experiment in the cultivation of potatoes in wards' estates was very successful, the outturn per local bigha ranging from 45 to 50 maunds, while in the office compound the outturn per bigha amounted to 147 maunds.

Gaya Government Estates.—Experiments were made in the cultivation of Muzaffarnagar wheat and the Naini Tal potato. Both the experiments were unsuccessful, the soil selected proving unsuitable for these crops.

Tikari Ward's Estates in Gaya.—Experiments in Muzaffarnagar wheat and white gram were successful. A sowing of lucerne grass failed, the soil proving unsuitable. The Burdwan rice raised last year was again successfully grown.

Darbhanga.—The Opium Department endeavoured to introduce the cultivation of the poppy among the raiyats of the Pusa Government estate, but the results were poor, the lands not having been manured.

Saran.—An experimental farm is being started at Sripur in the Hathwa estate, and some small experiments were conducted in *rabi* crops in the course of the year. Complete proposals have now been framed for the working of this farm, which is eventually to be chiefly utilised for experiments in cattle-breeding.

Bhagalpur Division.

92. *Purnea Government Estates.*—Experiments were successfully conducted with the Naini Tal potato, wheat, Kabul gram, *bhadoi* paddy, oats, *janera* and English vegetables.

Khaara Ward's Estate in Purnea.—Much valuable work has been done by the Manager of this estate in systematically clearing and settling jungle lands, and also in rearing and planting valuable trees.

Sonthal Parganas Government Estates.—An experiment is being conducted with some *sisal* hemp plants obtained by the Forest Department from Dr. Prain in 1896. The plants have not yet come to maturity, and no fibre has hitherto been obtained from them.

Orissa Division.

93. *Cuttack Government Estates.*—Some small experiments initiated in the Banki Estate in potato cultivation did not give encouraging results. Some experiments are in progress with sugarcane.

Cuttack Wards' Estates.—The experiments made with potatoes, sugarcane and Buxar wheat in the Madhupur Ward's Estate were very successful, but those undertaken in the Kujong and Kanika Estates failed. It is to be hoped, however, that the experiments in these estates will not be abandoned, as there seems to be no reason why, with proper supervision and perseverance, the excellent results attained in Madhupur should not be achieved, and improved varieties of crops introduced. It has been fully demonstrated in Madhupur that the raiyats are quite willing to adopt such varieties as soon as we demonstrate to them practically that they can be grown at a profit.

Cuttack Private Estates.—Experiments were made by Babu Gauri Sankar Rai, of Cuttack, with Nani Tal potatoes and Bombay radishes with indifferent results. The potatoes grown by him, however, were of very good quality, and obtained the first prize at the Cuttack Exhibition held in February last.

Puri Government Estates.—The experiment made with Naini Tal potatoes at Khurda failed, owing to the damage done by ants. It is, however, reported that potato cultivation is finding much favour among the neighbouring cultivators. The experiments with maize and tobacco, conducted by some of the raiyats to whom seeds had been distributed, proved very successful. The cultivation of wheat also met with some success, but the grains produced were not as large as the mother grains.

Balasore Government Estate.—The experiments made with Naini Tal potato in the Noanand Government estates met with but partial success, as the crop was damaged by a hailstorm, and also by white-ants and rats.

Angul Government Estates.—The experiments with Nani Tal potatoes and jute mostly failed owing to late sowing, but those with wheat and maize met with some success.

Orissa Tributary States.—Experiments were started during the year in almost all these States, generally with very promising results. A short account of the experiments conducted in each State is given below:—

Narsingpur.—Experiments were made with indifferent results in the cultivation of Muzaffarnagar wheat, Naini Tal and Cuttack potatoes, barley, gram, ground-nut and some English vegetables. The experiments with American maize, however, proved most successful.

Baramba.—American maize and *khari* sugarcane were successfully cultivated. It is reported that the whole produce of the sugarcane grown last year has been used as seed this year by the raiyats, who appreciate the value of this variety of cane.

Talcher.—The cultivation of potato, wheat and American maize was most successful. American maize was sown both in the rainy and cold seasons, and the results in both cases are reported to have been equally satisfactory. It is reported that under the *máli* deputed by this Department the Raja's garden has made much progress in the growing of English vegetables, including cauliflowers and cabbages, which were excellent both in quality and size.

Dhenkanal.—An experimental farm was established in the year under report at Korea, a village three miles from Dhenkanal town. The cultivation

of maize, potato, wheat and oats proved successful, but the experiments with tobacco and Garo Hill cotton failed.

Pal Lahara.—The seed of Naini Tal potatoes supplied to the Manager mostly rotted on the way. A few unaffected seeds were tried, and the produce, though small in quantity, was exactly like the seeds sown. The experiment will be repeated.

Chota Nagpur Division.

94. *Palamau Government Estates.*—Potatoes were experimentally cultivated with fairly satisfactory results. This being the first year of the experiment, a considerable sum of money was expended in preparing the fields, and the experiment was not therefore a financial success.

Manbhum Wards' Estates.—Experiments in the cultivation of potatoes, cabbages and gram were undertaken in the Nagarkeori ward's estates. Defective cultivation and insects brought about the failure of the crops.

Ranchi Government Estates.—Nine maunds of Naini Tal potato seed were supplied by this Department and distributed to 12 Government raiyats. The raiyats did not take that amount of care which was necessary for successful cultivation, and the result obtained was not so good as might have been expected.

Wards' and Encumbered Estates.—Experiments were made in the cultivation of the Naini Tal potato, Buxar wheat, cabbages and cauliflowers in the several wards' and encumbered estates. The experiment in potatoes was not successful, first, because the seeds got wet on the road from Purulia to Ranchi, and, secondly, because due care was not taken by the majority of the proprietors to whom they were supplied. It is reported that the soil of the district is suited to Naini Tal potatoes and Buxar wheat. The Manager cultivated potatoes and wheat in his own garden, and the outturn was 8 times and 14·6 times respectively of the seed sown.

Experiments made by the Agri-Horticultural Society of India.

95. The following report has been received from the Secretary to the Agri-Horticultural Society on the fruit-garden maintained by the Society, and on the experiments made during the year under report :—

The Fruit Garden.

This section received great attention during the whole year, and has been enriched considerably by the addition of several useful new varieties and species of fruit trees.

Anona cherimolia.—The Cherimoyer seedlings planted out in 1897 have now attained a height of 18 feet, but propagation has again been unsuccessful. *Anona muricata*, the Sour Sop, has also grown considerably, and it is expected that it will fruit during the coming year.

Anona species, Upper Congo—Has been widely distributed during the year in Assam, Burma, and throughout the country. From all accounts this should prove a valuable addition to the fruit garden; the fruit is said to resemble a cross between the Custard Apple and Bullock's heart, but far superior to the former.

Amygdalus persica.—The new varieties of Peach planted last January made good growth throughout the year, and several were propagated; the China varieties, however, mostly failed.

Ananas sativa.—During the rains a plantation of the four varieties of Pineapple—Duchess of Portsmouth," "Giant Kew," "Kew," and "Singapore"—was laid out for stock; so far all have done well, and the majority show signs of producing fruit during the coming rains.

Averrhoa Bilimbi.—The single specimen of the Star Fruit has made excellent growth and produced half-a-dozen young plants, which will be put out for stock next season.

Bouea burmanica.—Twelve young Marian plants were received from Rangoon late in the season, and will be planted out on the advent of the next wet weather. The old surviving specimen, planted in 1897, appears to have been planted in too exposed a position, and suffers from the heat.

Carica Papaya.—Seeds of a variety of Papaya from Fiji were received from Mr. A. C. Stewart, of Calcutta, but only four plants were raised; these, it is hoped, will survive the hot weather, and will be planted in the rains.

Citrus.—The already extensive collections of varieties of Citron, Lemon, Limes, Oranges and Pomelos has been added to. All varieties are doing well, with the exception of Chinese varieties, which grow slowly and prove difficult to propagate unless budded on Pomelo stock, the same may be said of the Malta Orange. Great care, however, has to be taken with plants budded on the Pomelo stock for two years at least, and all shoots of the stock have to be cleaned off immediately on appearance; otherwise they grow fast and rob the bud of sustenance. This

refers to Lower Bengal, where the Pomelo is of vigorous growth. All blanks in the old grove were filled up, and a further lot of 150 plants of various kinds were put out for stock. None of the Oranges have yet fruited, though Citrons, Lemons, Limes and Pomelos fruit freely. Among the Pomelos the two best are No. 1 (Pink) and Society's (Alipur), both being large fruited, with sweet juicy flesh. The sour Pomelos *Sui-gul* and *Sankhdrav* bear fruit in abundance, but are unfortunately intensely sour.

Diospyros Kaki.—The demand for the Japanese Date Plum was rather less during the past year than in 1897. The specimens planted out at the Gardens have now attained a height of 5 feet and are of sturdy growth. Several plants were sent to the Political Officer, Sikkim, for experiment, and some to Nepal, but nothing has been heard as to their progress.

Ficus carica.—Ten out of the thirteen varieties of Fig imported survived the hot weather and rains, and were planted out on the approach of the cold weather. The table Fig has not in my experience proved a success in this district, but I have only tried three varieties, of which the Green Turkey has given the best results; this however, is frequently attacked by a small beetle, and is difficult to propagate.

Mangifera indica.—A further addition of choice varieties of Mangoes was made to the already fairly extensive stock, and all are growing strong. The new Mango grove formed at the commencement of last year fared badly in May and June owing to want of irrigation, and half the number of grafts died.

Morus alba, M. nigra.—The large selected varieties of white and black Mulberry have done wonderfully well, growing to a height of 26 feet during the year, and give promise of heavy propagation next season. If these two varieties produce half as good crops as *M. Indica*, they will prove a grateful addition to the orchard.

Musa.—Six varieties of Plantains from Ceylon received last year were planted out in July at the Gardens and Nursery. At the end of the rains, when examined, the various kinds appeared to be greatly mixed; as none have fruited yet, it is impossible to say which are correct. The red Banana from Singapore has also been planted out and should "clump" next rains. The cultivation of the best table varieties is being extended at the Nursery.

Pyrus communis.—The two varieties of Pear, "Kieffer" and "Le Comte," received for experiment have made little growth and are barely 6 inches taller than when planted out in 1896.

Rubus trivalvis.—The American Dewberry produced a small crop of fruit in April, chiefly remarkable for the large seeds and small quantity of pulp of a slightly acid flavour. Though not a success in Bengal, I hear it has done well in the Jalpaiguri Terai and in parts of Assam, while at Simla and in the Kangra Valley it proved a welcome addition to the already extensive number of table fruits in those districts.

Vitis vinifera.—The twelve varieties of Vines imported last year were planted at the Nursery during the rains, but have not made any growth yet. Probably they will shoot during the rains, and propagation will be undertaken when they are strong.

In passing I would add that the entire fruit section at the Gardens is attended to during the greater part of the year by three coolies, four boys and myself. As there are some 500 mother-plants, and nearly ten times that number of young plants in pots, it will be seen that the establishment in this one section is none too large.

Experiments.

As usual, a considerable quantity of seed was distributed for experimental purposes, including Reana, Lucerne, Japan Clover, Paddy, Maize (American and acclimatised), Cotton, Tobacco, Oats, Coffee, Sunflower, Tapioca and Rhea roots.

At the Gardens and Nursery, Reana has always proved a paying crop, and this year again a good quantity of fodder was cut for the Garden bullocks, while the outturn of seed was all that could be desired. Various kinds of Maize seed were tried at both Gardens, but it was found impossible to protect the produce during the day from birds and squirrels, while at night jackals did great damage. No good results appear to have been obtained in this district in the cultivation of imported Maize seed, but some excellent cobs were received from Mr. W. Helps of the Baintbarrie Tea Estate in the Jalpaiguri district. Very good reports have also been received from Assam and Tirhut. A large extra consignment of Maize seed from America miscarried in transit last March, causing great disappointment to those who had registered their names for a supply.

Rice.—As regards Carolina Paddy, this again proved a failure wherever tried. The Ceylon varieties in some cases were excellent, but owing to the fact that the autumn, winter and spring kinds were supplied without any particulars or distinguishing instructions, the whole consignment was taken as consisting of autumn varieties and were sown accordingly, the mistake only being discovered when the plants were in ear. The produce of the true autumn varieties was all that could be desired.

Desmodium tortuosum.—The Florida Beggar weed, as a forage plant, has done well at Alipur, and withstood the drought last hot season with little or no irrigation. Similar results have been reported from various parts of the country.

Cotton.—Five varieties of American Cotton were sown at Alipur, but none did well. Sea Island and Upland alone producing a few pods containing a very inferior quality of cotton. The two varieties from Egypt, Abbassi and Affifi, however, gave excellent results; samples have been sent to Liverpool for report, which will be published when received. The latter variety is said to be most popular in the Cairo district, yielding profusely and withstanding

most unfavourable weather. It has certainly done well here, and in spite of being sown late in the season, has produced a good crop of cotton. As the seed separates most readily from the staple, it will no doubt become a valuable variety to cultivate in this country. A quantity of acclimatised seed of both varieties has been reserved for further experiment. Neither of the two above-named kinds have been artificially irrigated since the close of the rains.

Tobacco.—The experiment conducted at the Nursery with varieties received from the United States, Burleigh, Vuelto Abajo, Rano de Sumatra, Sweet Orinoco and Landreth's proved successful as far as yield of leaves went, but the quality was greatly spoiled by the thick ribs and improper curing. Vuelto Abajo was rapidly taking a first place among Cuban cigar manufacturers before the war, while Landreth's is considered the best cigar tobacco grown in America.

Mucuna pruriens.—The Florida Velvet Bean regarding which so many articles have appeared in *Indian Gardening* during the past year, has been experimented with on a fairly extensive scale; but so far as results go it seems in all respects to resemble our Kamach (*Mucuna invea*). The experiment was taken up at the request of a correspondent in America, in whose opinion this "new bean" would prove of great benefit in famine-stricken tracts; the first batch of seeds cost five shillings a pound, but the produce in no way excelled that of our indigenous species, which can probably be obtained at five farthings a pound. This Bean appears to have been put on the market for sale in the same manner that the so-called improved form of *Lathyrus silvestris* was foisted on the public five years ago, and regarding which nothing is now heard.

Tapioca.—The demand for cuttings has been very heavy this year, exhausting all the stock in hand. All the indents, strange to say, come from remote parts of the country, such as Northern Assam, South India, Cutch, Meywar and Sind. The cultivation in these parts appears to have been discontinued.

Yams.—Two species imported from Barbados and Natal have been grown for the past two years; the latter grew rapidly, but on being cooked and tested, did not prove as palatable as those obtainable in this country. The Barbados *jât* is not yet mature enough to test, and will be cultivated for another year.

China cabbage (*Brassica chinensis. Karamsag*).—This species of Cabbage, though not equalling the imported kinds, thrives remarkably well in the Calcutta district during the hot weather and rains, when good vegetables are not obtainable, and forms an acceptable addition to the table. A quantity of seed has been distributed to members, but no reports have been received.

Brinjals (*Solanum Melongena*).—Experiments are being conducted with several varieties in order to ascertain which will prove best for Lower Bengal, and also the most suitable season for sowing the different varieties. It is yet too early to make any report on this experiment, but so far, Gorakhpur No. 2 and Tres Grosse de Paris would appear to do best if sown after the rains.

Peas.—Three sealed collections of vegetable seeds received from Messrs. Sutton & Sons, Reading, D. Landreth & Sons and R. Buist Co., Philadelphia, U. S. A., in 1897, being the crop of the previous year, were tested in beds after the rains were over. Very few kinds germinated, but all varieties of Peas came up well, the average germination being 75 per cent., a remarkably good result, considering that the seeds passed through two hot and rainy seasons in Calcutta.

Rhea.—Owing to the very low prices offered for roots, the cultivation of this fibre plant has been discontinued at the Gardens, and I hear other plantations have been closed for the same reason. The prices now offered for uncleaned ribbon are scarcely higher than those paid for Jute.

Agave.—Enquiries for offsets of *Agave americana* and *A. rigida* var. *Sisalana*, have been numerous, but the Society has not been able to meet demands. Last September a report was called for, regarding the cultivation of the Sisal hemp plants distributed through the Society in 1892 and 1893. Only six replies were received from fifty persons addressed, and results published in the November Proceedings. One member in Tirhut, being confident of its success, was desirous of joining capitalists to cultivate it on a large scale.

Curculigo recurvata.—Experiments were conducted with the Weevil plant with a view to improve the quality of fibre so much used in Borneo and the adjacent islands, but all samples tested proved valueless.

Pineapple.—After the lapse of half a century, public attention has once again been drawn to this fibre-yielding plant, principally due to the exertions of Mr. J. Buckingham, C.I.E., of Amguri, Assam. A note on the progress made in this direction appears in the Journal and Proceedings for November last.

It is satisfactory to note that tea planters are now making enquiries with a view to give this excellent fibre-yielding plant a fair trial. Numerous samples of fibre have been received for report during the year under notice, but in each case the quantity received was insufficient for the purpose of testing, and thus expert opinions were not favourable.

Rum dye.—During the month of May, two boxes containing 100 cuttings of *Strobilanthes flaccidifolius* were received from the Director, Department of Land Records and Agriculture, Assam, for experiment. With a few exceptions, all the cuttings arrived dead; and the remainder did not survive a week. An interesting letter regarding the Assam Indigo (*Rampat*) from the Revd. P. H. Moore, Nowgong, Assam, was read at the August meeting.

Indigo.—With the advent of artificial indigo made in Germany, many planters are turning their attention to the improvement of the true indigo plant, and the cultivation of various other indigo-yielding plants, with what success, however, nothing is yet known.

Jadoo fibre.—No further experiments were conducted with this material. The balance of stock was used in propagating the Citrus tribe, but by the end of the rains it was found that all plants treated with Jadoo had developed a luxuriant crop of fungoid growth at the roots, which caused the death of a large number.

A new Weed Destroyer.—During the month of October last, a can containing a bye-product was received through the Editor, *Indian Gardening*, from the North-West Soap Co., Ld., which, it was suggested, would prove of use as a weed destroyer. Several applications of the liquid were given to various patches of jungle in odd corners of the Garden, but it did not affect the weeds to any appreciable extent. A patch of jungly *Kachu* (*Alocasia sp.*) treated with it appeared to produce more luxuriant growth in about a month, some of the components no doubt being insufficient in quality or strength.

Ichthemic Guano.—A parcel of this manure was received from the Himalaya Seed Stores, Mussoorie, in August for experiment. The following plants were immediately treated with the Guano and have made remarkable growth, viz., Ferns, Palms, Begonias Gesneras, Amaryllids, Crotons, Dracænas, ground Orchids, Asparagus of sorts, Roses and Anthuriums. The prescribed dose for pot plants, a tablespoonful to a gallon of water, was given every third day.

I think greater effect would be noticeable if the majority of plants are manured at the commencement of the rains.

Roses were treated at the end of November, and by the new year had commenced to bloom. This new manure is fairly cheap, and should prove of great value to all amateurs throughout the country.

The Aermotor.—A full report on this machine has already appeared. As we are now in a season when the wind is merely on the surface, rarely rising more than 50 feet, the Aermotor has had little chance of exhibiting its capabilities. This will, no doubt, be proved during the hot weather, as our strong breezes commence in March and continue till the rains. Two tanks to store water have been erected near the outfall, and 2,337 feet of masonry drains have been constructed, chiefly with old bricks found in the Garden. Many more tanks, however, are needed for the storage of water, and at least another 3,000 feet of *pucka* drains to complete the distribution of water over the greater part of the Gardens.

Jyree.—Enquiries regarding this plant, referred to in the August Proceedings, were made in South India, but the sample being lost in postal transit, no information leading to its identity was forthcoming.

Entomology.—During the past year, 146 species of butterflies and 94 species of moths were caught in the Gardens, besides a number of beetles. The majority have not been identified, but it is hoped that the names of all will be procured during the coming summer. Many of the above will help us in identifying caterpillars and grubs doing damage in the Gardens.

The following is an abstract from the Garden issue books of plants sent out in free allowance, exchanged and sold in 1898:—

	1898.	1897.	1896.
Mangoes	1,947	1,819	1,901
Lichis	1,603	1,437	1,462
Other fruits	3,881	3,793	3,808
Economic plants	5,719	7,047	11,993
Roses	3,742	3,915	4,811
Crotons	2,314	3,431	3,641
Palms	2,097	1,789	1,740
Ferns	1,412	3,860	4,435
Bulbous plants	3,642	2,917	4,361
Other ornamental and flowering plants, &c.	20,115	20,074	24,359
Total ...	48,472	50,082	62,511

Trial of improved Agricultural implements in Wards', Government and Private estates.

96. The implements distributed to different persons during the year under report were 17 Sibpur ploughs, 16 Meston ploughs, 14 Baldeo ploughs and one Sibpur hoe. A full account is given in Appendix II of the various new implements that have been tried during the year. We are still in search of a plough that will prove to be a real improvement on the country ones, and the only implements that have been successful enough to attract custom from the cultivators themselves are the well known iron sugarcane mills from Behia. Appendix II has been prepared and attached to this report in accordance with the

recent orders of the Government of India, and the submission of a separate report on this subject for the year ending September 30th will be discontinued.

Supply of Seeds, Manures and Implements.

97. A list of seeds, implements, manures, etc., distributed by the Department during the year 1898-99 (exclusive of those used in experimental farms) is given in Appendix III.

Crop-cutting experiments by District Officers and Settlement Officers.

98. The last quinquennial report on these crop-cutting experiments having been submitted in March 1898, the next report is not due until the year 1903. In the meantime revised rules for the conduct of the experiments have been circulated, with copies of a suitable form in which to record the results arrived at, and the annual returns submitted by District and Settlement Officers are being received and compiled in my office. The subject of the improvement of these returns and the multiplication of cuttings of the more important crops is receiving my special attention during my tours, and action is being taken to enlist the more active co-operation of local officers in this branch of our work.

Crop-cuttings in jail gardens.

99. The report on these crop-cuttings, which was submitted to Government in October 1898, showed a steady decline in the attention paid to the Government orders under which they are being made, and this fact was brought to the notice of the Inspector-General of Jails. Thirty-nine cuttings were made in 17 jails in the year 1897-98, as compared with 74 cuttings in 34 jails made in the year 1894-95. The returns for 1898-99 have not yet been received.

Locusts and other Insect-pests.

(*1*) *Locusts.*

100. Whereas locusts were observed in many districts in the course of the years 1896-97 and 1897-98, only three visits are reported by District Officers during the past year. In October 1898 a small area in the district of Manbhum suffered from an incursion of these insects, which are said to have reduced the outturn of the standing crops by 12 per cent.; in November of the same year a flight of them was observed in the Gopalganj subdivision of the district of Saran, but is reported to have done little damage, while early in 1899 they appeared in part of one thana of Hazaribagh, where they damaged the wheat and mustard to a small extent.

(*2*) *Other Insect-pests.*

101. The information received as to the insects which have done damage to the crops in various districts is still indefinite, but in some cases the suggestion put forward in the annual report for 1897-98, that specimens of the insects should be sent down to this office for examination and identification, has been acted upon, and it is to be hoped that further efforts will be made during the current year to ascertain the species of the insects referred to, in order that action may be suggested, if possible, to prevent or cure the damage wrought by them. The grass-hoppers referred to in my report of last year are reported to have done a good deal of damage to the rice crops in Midnapore and Singhbhum, and no means of coping with this pest appear to have been yet discovered. Caterpillars did some damage in Shahabad and Champaran. Specimens have been forwarded from the latter district for identification.

The minute insect identified as *Leptocorisa Acuta Thumb.*, which did much damage in several districts in 1897-98, appeared again in the past year in Cuttack, Champaran, and Backerganj, and did some damage to the rice crops.

The winter rice crop in a few villages in Cuttack was also seriously attacked by an insect locally known as *mohura*, which does not appear to have been accurately identified as yet. In the Khurda subdivision of Puri, a species of insect known locally as *jhintika* appeared in November and December last.

The most serious report received during the year was, however, that of the ravages of the common rice *hispa*, a black beetle belonging to the order of *chrysomelids*. These insects have attacked the paddy seedlings in two thanas of Backerganj, and have destroyed 50 per cent. of them in some places. At the request of the Collector, Mr. N. N. Banerjei paid a special visit to the district to inspect the damage done and to procure specimens of the insect, and his report and the specimens have been handed over to Major Alcock, I.M.S., who is in charge of the Entomological Section of the Indian Museum, in order that the life history of the insect may be studied, and remedies for the destruction caused by it may be devised. Efforts made to mitigate this destruction by smoking or the spraying of insecticides have hitherto proved ineffective.

Sericulture.

102. At the commencement of the year under report sericultural work was being conducted by this Department in accordance with the orders of Government dated October 1896, by which a sum of Rs. 3,000 per annum was granted towards the cost of opening seed nurseries conducted on scientific principles in each of the principal *joárs* or seed centres of Bengal, these nurseries being ultimately handed over to trained rearers to carry on without further pecuniary aid from Government. Early in the year, however, I was approached by representatives of the chief silk firms of Murshidabad, the centre of the silk industry in Bengal, and was asked for advice and assistance in the matter of a private scheme for the rapid and effective introduction of Pasteur's system of silk-worm rearing throughout the silk districts of Bengal. It appeared that several firms had united to subscribe a sum of Rs. 5,000 per annum, guaranteed for three years, for the purpose of teaching this system to the rearers of Malda, Murshidabad, Rajshahi and Birbhum, that they had already appointed a competent officer, who had received his training under Mr. N. G. Mukherji, as Superintendent, and were prepared to spend a considerable sum on appliances and other incidental expenditure as soon as they were assured of some practical support from Government. It appeared to me that the proposed scheme was an important development of the plans already adopted by Government for sericultural work, and that it opened out the prospect of the establishment of the sericultural operations already in progress on a business-like and self-supporting foundation. I accordingly did what I could to assist in the framing of a scheme for carrying out the proposal, and subsequently attended the opening meeting of the newly-formed Bengal Silk Committee at Berhampur, where the general plan of work was laid down and the necessary practical details were determined. I further paid a visit to the *joárs* of Malda, where operations were to be commenced, and consulted with the Committee's local Superintendent, and was thus enabled to inform myself fully as to the actual working of the Committee's scheme. I then addressed Government and explained the proposed scheme in detail, forwarding copies of the proceedings of the meeting at Berhampur and asking sanction to the diversion of the annual grant of Rs. 3,000 to supplement the Committee's resources, all direct control over the operations, with the exception of those carried on by the Rampur Boalia School, being transferred to the Committee, upon which the Collector of Murshidabad was to act as the representative of Government. In Revenue Department letter No. 60, dated 11th January 1899, His Honour the Lieutenant-Governor was pleased to approve of these proposals as "calculated to end in some practical results being achieved quickly and cheaply," and the grant of Rs. 3,000 per annum was placed at the disposal of the Committee on the condition that the subscriptions raised by the Committee were duly paid in.

103. In accordance with the scheme as thus approved the Government sericultural nursery at Chaltia was closed, and the services of the travelling sericultural Overseer, with all the appliances for sericultural work in his hands, were placed at the disposal of the Committee, while the rearers in the nurseries recently established by Government were given the option of purchasing the

appliances lent to them at low rates, or of placing their work under the supervision and control of the Committee.

104. The Secretary to the Committee has submitted a report of the work done up to the close of March 1899, of which the following is a brief summary. The Committee confined their work of teaching to the silk-rearing districts of Malda, Murshidabad and Birbhum, and founded three scholarships of Rs. 6 each at the Rampur Boalia Industrial School for the benefit of sons of actual rearers. Work was commenced in the upper *joârs* of Malda on the 1st June 1898 with 10 rearers who were taught scientific methods of rearing by the Superintendent, Babu Apurba Kumar Ghose, assisted by two sub-overseers. In Birbhum similar work was begun with 7 rearers, and in Murshidabad with 12 rearers, under the supervision of Babu Abinas Candra Sinha, formerly overseer in this department, and by four sub-overseers. By the end of the year 22 microscopes were distributed amongst the rearers in Malda, and there were 97 rearers under tuition. The quantity of cocoons raised in the March *hund* by rearers under the Superintendent's supervision amounted to 397 maunds, or 20,000 kahans, and the quantity of selected seed used for this purpose was 239 kahans. The average return per kahan of selected seed thus amounted to 83 kahans, as compared with a previous average of little more than 50 to 60 kahans. The cocoons also sold very well, the prices obtained ranging from Rs. 35 to Rs. 42 per maund of 50 kahans, against Rs. 20 to Rs. 25 realised by the ordinary cocoons of the districts concerned. The overseer in Birbhum was successful in inducing rearers to resort to disinfection with sulphur for muscardine, and in rearing good crops for the *Châit hund*, 63 kahans of cocoons being raised per kahan of seed, as compared with the average return of 40 kahans raised hitherto by the rearers. The cocoons raised from examined seed sold at the average rate of Rs. 32 per maund of 50 kahans, against an average market price of Rs. 20 per maund. By the end of the year three microscopes were distributed for the use of rearers, and there were 30 pupils learning the new system of rearing. The work was commenced too late in Murshidabad to affect the seed crops of the year, but three microscopes have already been allotted to this district. Ten microscopes valued at Rs. 580, and other sericultural appliances valued at Rs. 227, were sold during the year to the rearers of Malda. No microscopes or other appliances have been sold as yet to the rearers in the *joârs* of Murshidabad or Birbhum, but sulphur and sulphate of copper have been purchased in considerable quantities by the Birbhum rearers, and the demand for these disinfectants is steadily increasing in this district. The Birbhum rearers are not so rich as their brethren in Malda, and are not at present in a position to lay out money on microscopes. Three microscopes valued at Rs. 174, and sulphur and sulphate of copper to the value of Rs. 35, were also purchased by Mr. J. Fraser Forbes of the Bengal Silk Company's factory at Sardah in Rajshahi for free distribution to rearers. The receipts of the Committee during the year amounted to Rs. 6,332, and the expenditure to Rs. 7,104. The excess expenditure of Rs. 782 was advanced by Messrs. L. Payen & Co., whose local Superintendent, Mr. P. E. Gourju, has been chiefly instrumental in carrying through the new scheme of work. Against this balance, there was a set-off of Rs. 766, the price of appliances sold which has not yet been recovered.

105. The results of the year's working of the new scheme appear to be extremely satisfactory, and it may be hoped that, with the rapid extension of Pasteur's system of rearing and disinfection, the devastations caused by pebrine and muscardine, which have quite recently threatened the total extinction of the Bengal silk industry, may be checked and that these diseases may eventually be altogether eradicated.

106. The Rampur Boalia Industrial School has made considerable progress in its sericultural work in the course of the year, and at my suggestion Government was pleased to accord its sanction in January last to the grant of an annual subsidy of Rs. 500 to it, in order to enable it to send out trained men into the villages properly equipped with all the necessary appliances for teaching and working on approved principles. Fifteen students (4 Hindus and 11 Muhammadans joined the school as regular students during the first year of its existence. They were examined twice during the year, and at the final

examination held in January last 13 students passed the test. The first two students were awarded prizes of Rs. 175 each to enable them to start seed nurseries in the interior of the district. Four students obtained employment under the Bengal Silk Committee and two have been employed by Mr. Robindra Nath Tagore to assist him in an experiment he is making with a view to the introduction of the rearing of Assam silk cocoons in his zamindari in the district of Nadia. During the present year, the second year of the school's existence, there are 31 students in the sericultural branch, and 7 others in the dyeing and weaving branch.

The teacher of sericulture also gave instruction and advice to several other persons interested in the industry, and assisted them to improve their methods of silk-worm rearing. Besides the actual work of teaching in the school, experiments were made during the year under report in rearing, reeling, bleaching, dyeing and weaving, and all the processes employed in these operations were thoroughly explained to the students. Samples of cocoons, moths, thread, and cloth reared and manufactured in the school were exhibited during the year with success at the Industrial Exhibition in Calcutta, and at the Bagirhat Exhibition in the district of Khulna. I inspected the school in September 1898, and put on record various suggestions for its development and improvement.

The year 1898-99 opened with a balance of Rs. 6,470 to the credit of the District Fund, and contributions to the amount of Rs. 3,764 were received, which brought the total up to Rs. 10,234. The disbursements amounted to Rs. 3,838, and the year closed with a balance of Rs. 6,396. The noticeable success of the school is largely due to the excellent work done for it by the Secretary to the Committee which controls it, Babu Akshay Kumar Maitra, B.L., a pleader of Rampur Boalia, who has spared neither time nor trouble to further the interests of the school, and has managed its affairs with much ability.

Arboriculture.

107. *Date-palms* (*Phœnix Sylvestris*).—In accordance with the suggestion of the Government of India contained in their circular No. $\frac{30A}{15-9}$, dated the 1st May 1886, a copy of which was received with the Bengal Government memorandum No. 370 T. R., dated the 21st idem, the experimental cultivation of the Arabian date-palm (*Phœnix Sylvestris*) was at first undertaken in the Bhagalpur and Orissa Divisions. But the experiment having failed in these divisions owing to their damp climate, it was transferred in 1887 to the drier tracts of the Chota Nagpur Division and to the districts of Patna and Shahabad in the Patna Division. The reports hitherto received and embodied in the annual reports of this Department tend to show that the climate of these Provinces is not very well suited to the cultivation of this date-palm. The reports on this subject received this year from the officers concerned are also more or less unfavourable.

Most of them have reported that the plants grown are either dead or are making slow growth. It is only in the district of Shahabad that the plants are reported to be thriving.

Eucalyptus tree (*Eucalyptus Globulus*).—The result of the experimental cultivation of the Eucalyptus tree in the district of Hazaribagh is reported to be satisfactory. The trees that were planted 11 years ago are thriving well, and the plants raised from seeds procured from these trees are also flourishing.

Divi-Divi trees (*Cæsalpinea Coriara*).—The Deputy Conservator of Forests of the Sonthal Parganas Division reports that the old trees at Katikund and Jhilimili are growing well, though they were damaged by hail and storm. The plants that were raised at Katikund last year are also doing well. During the year under report 600 plants were planted, of which 400 are now living, and three seers of seeds were sown in beds and have germinated well.

108. The subject of tree-planting and the maintenance of avenues on public roads, canals, etc., is dealt with in the annual reports of Local and District Boards, and of the officers in charge of District Road Funds and District Road Accounts, and the work done each year is reviewed by Government in the Resolutions issued by the Public Works Department on those reports.

CHAPTER VI.

AGRICULTURAL EDUCATION.

109. *Agricultural classes at Sibpur.*—The Principal of the Civil Engineering College at Sibpur has favoured me with the following report of the working of the Agricultural classes in the College during the past year:—

REPORT ON THE AGRICULTURAL DEPARTMENT, CIVIL ENGINEERING COLLEGE.

It was intended that the classes should begin work at the beginning of June, but owing to a delay in the publishing of the results of the University examinations, they did not open till the 27th of the month.

The upper class started with 18, divided as follows:—

Admitted under rule 3	(*i*)	...	... 4
Ditto	3 (*ii*)	...	... 12
Ditto	3(*iii*)	...	... 2

Of these, during the session, 7 withdrew, leaving 11 who continued their studies to the end of the session.

In the lower class three joined, including the farm apprentice. He left during the session. The two that remained worked well.

The working of the classes was conducted practically in accordance with the syllabus attached to the Government Resolution No. 1141, of the 15th March 1898. The only change was a short course of the elements of surveying given to the higher class. This appeared to me to be a useful addition to their studies.

The number of admissions was regulated by two considerations: accommodation in the barracks, and the number of benches and the apparatus available for proper instruction in the chemical laboratory. In the small part I had to do with the starting of the agricultural class I insisted strongly on the advisability of turning out a few students well trained rather than a larger number with only vague knowledge. My experience in another new department of the college, electrical training, has confirmed me in my opinion. The electrical course has been confined to a few students, who have had a previous engineering training, and the result has been that every student who has gone through this course has obtained employment at once and on good pay, in every case under private firms, who have reported favourably on their work. The number who left during the session, 7 out of 18, is very large, and is due, I believe, to insisting on the students doing manual work in the farm. The same difficulty was found in the early days of the Engineering Department, but it soon disappeared. All the special students entered under rule 3(*iii*) withdrew during the session, which leads one to the belief that the object of those who enter the agricultural class is Government employment and not knowledge of agriculture.

* * * * * * * *

New cattle sheds and labourers' quarters, I consider, should be built. The present ones are thatched roofed, and thatched roofing means always a considerable annual cost in repairs. The labour question is a difficult one here, and now that there is so great a demand on the part of the railways and Port Commissioners, it is advisable to make the labourers one has as comfortable as possible.

The work in the chemical laboratory is described in Mr. Tate's report, a copy of which is sent. With his remarks at the end of his report I entirely agree, and they point strongly to the necessity of at least a two-years' course.

Dr. Gage, the lecturer on Botany, has sent me also a favourable report on the work of the class under him, but he says his work is handicapped for want of models and microscopes.

Teaching in hydraulics and geology was given by the Professors of these subjects to the agricultural students, together with the students of the Engineering Department.

During the year a good deal of work was done in the workshops in repairing and renewing the machines on the farm. The hand chain pumps put in order worked well, but an experiment made on a chain pump worked by bullocks was not satisfactory. This type of pump requires steady working, and untrained bullocks work irregularly. A number of agricultural machines were repaired in the workshops, and from my experience of them I can say that they were originally exceedingly badly made. They were evidently made to be sold cheap.

A practical difficulty was found with regard to the 14 months' course. It was intended that the students who joined in June 1898 should continue in the College until August 1899, and that another set should join in June 1899. This meant carrying on two classes during July and August with only one set of teachers, and increased demand on the accommodation in barracks.

Pending a final settlement of this difficulty, Government ordered that the old class should continue until the end of June and the new class begin at the beginning of July.

Government has called for a report on this point and it is nearly ready for submission.

The examinations of both classes were held at the end of June. In the higher class nine passed out of 11 and the two in the lower class both passed. The work done in the examination was good.

I have to report favourably on the conduct and discipline of both classes.

A. MACDONELL,

Offg. Principal, Civil Engineering College.

REPORT ON THE CHEMISTRY COURSES OF THE HIGHER AGRICULTURAL CLASS, JULY 1898 TO JULY 1899.

THE attendance, general behaviour, and industry of the eleven students examined has been excellent.

The work accomplished in the laboratory includes:

(*a*) Thorough qualitative analysis of inorganic materials, including phosphates, silicates (soils, &c.).

(*b*) Qualitative examination of a few of the simpler organic substances present in agricultural products.

(*c*) Preparatory, representative gravimetric and volumetric analytical methods.

(*d*) A complete analysis of *kankur* (preliminary to soil analysis).

(*e*) Some work on the polarimeter as applied to the examination of sugars.

On examination, the average marks obtained $=55\%$ of the total possible, minimum $35\frac{1}{2}\%$, maximun $75\frac{1}{2}\%$. Such a result indicates good work in the very limited time available.

Comparing the time allotted to Practical Chemistry with the time given in European Colleges, it is evident that the complete course cannot be worked through by the best students likely to attend at this college; *e.g.*, at the Royal College of Science, London, a minimum of 1,000 hours is devoted to Practical Chemistry by Agricultural students who are expected to have some sound preliminary knowledge of the subject, whereas with approximately the same course there are at this College but 350 hours allotted for this purpose, and further, the students entering the course have practically no useful knowledge of analytical methods, even B. A.'s and M. A.'s being quite incompetent to carry through a simple qualitative analysis on joining the class.

If it be considered desirable to give the students a reasonable, thorough grounding in analytical chemistry as applied to agriculture, I would suggest that it is absolutely necessary to extend the course to two years, and that *at least* 700 hours will be required for work in the laboratory. With such an arrangement, reasonable, intelligent students can receive a fair training in analytical work, sufficient to enable them to adequately profit by and to understand the work done elsewhere, and to enable them to carry out reliably the more ordinary analysis. They will not, however, at the end of two years, be by any means expert analysts.

Such an extension of time will not (provided the class is limited to 16 students in each year) entail any increase of the chemical staff, but will require a considerable initial expenditure for almirahs, apparatus, and chemicals, and an increased annual grant for maintenance.

WILLIAM TATE,

Professor of Chemistry,

Civil Engineering College.

110. *The Bengal Veterinary College.*—During the year under report the status of the Bengal Veterinary Institution was raised to that of a College, and the course of study was extended to three years. An account of the working of the College, incorporated in the Annual Report of the Bengal Civil Veterinary Department, has been separately submitted to Government.

CHAPTER VII.

PUBLICATION OF AGRICULTURAL INFORMATION.

111. The following forecasts of harvests, special reports of crops, agricultural statistics, and other agricultural reports were prepared and published by the Department during the year under report:—

(1) Report on the outturn of *rabi* crops of 1897-98.
(2) Preliminary and final reports of the jute crop of 1898.
(3) Preliminary and final reports of the *bhadoi* crops of 1898.
(4) Preliminary and final reports of the winter rice crop of 1898.
(5) Report on the early and late cotton crops of 1898-99.

(6) Preliminary and final reports of the indigo crops of 1898.
(7) Final report of the wheat crop of 1897-98 and statement of prices of food-stocks and preliminary forecast of the wheat crop of 1898-99.
(8) Final report of the oilseed crops of 1897-98 and preliminary forecast of the oilseed crops of 1898-99.
(9) Tables of agricultural statistics for 1897-98, comprising Table A(*i*), Table A(*ii*), and Table D.
(10) A consolidated table showing the average wholesale prices of food-grains, firewood, etc., in the principal marts of Bengal for the year 1897-98.
(11) A list of agricultural implements and machines which were tested during the year 1898, and of those in use which were reported to have met with more or less marked success during the year.

The crop forecasts and agricultural statistics were printed and distributed, as in the previous year.

In addition to the above—

(1) Statistics showing the production of minerals and gems,
(2) List of prices of *ghi*, potatoes, mustard oil, cocoanut oil, firewood, bamboos, bricks and lime, and
(3) A return of crop cuttings made in jail gardens

were also prepared.

CHAPTER VIII.

FINAL.

Emigration to Burma.

112. The Managing Agents of the British India Steam Navigation Company report that 197 adults and 56 children were conveyed by their steamers as State emigrants to Burma during the year, as compared with 276 adults and 87 children in 1897-98. The Government subsidy for their conveyance amounted to Rs. 675.

Agricultural Exhibitions.

113. Exhibitions were held at the following places during the year, grants of funds being made to some of them out of the sum sanctioned by Government for that purpose—

Name of place.	District.	Government grant.
		Rs.
(1) Suri	Birbhum ...	150
(2) Kalimpong ...	Darjeeling ...	500
(3) Alipur	Jalpaiguri ...	200
(4) Falakata	Ditto ...	300
(5) Bera	Pabna ...	Nil
(6) Rukindipur ...	Bogra ...	200
(7) Sonepur	Saran ...	125
(8) Sitamarhi ...	Muzaffarpur ...	100
(9) Berhampur ...	Shahabad ...	Nil
(10) Tintanga ...	Bhagalpur ...	Nil
(11) Madhupur ...	Sonthal Parganas ...	Nil
(12) Cuttack	Cuttack ...	100

A brief account of each of these exhibitions is given below, and further details concerning the more important of them will be found in the Annual Report of the Civil Veterinary Department, and in the special reports on them which have already been submitted to Government.

114. *The Suri Cattle and Agricultural Show.*—The third annual exhibition of cattle and agricultural produce was held at Suri on 25th to 27th January 1899. The objects of the exhibition are the improvement of the breeds of cattle and poultry, and the encouragement of the production of good cereals and vegetables in the Birbhum district. The arrangements for the show are in the hands of a strong local Committee, assisted by Veterinary Major Raymond, Superintendent of the Civil Veterinary Department, Bengal. The exhibition was well advertised by preliminary notices issued in November and again by

detailed information as to prizes, &c., circulated in December 1898, and appears to have been a great success, an improvement being observed in both the numbers and the quality of the animals exhibited. Subscriptions amounting to Rs. 1,403-8 were collected for the purposes of the exhibition, and as the expenditure was Rs. 1,041 only, the balance in the hands of the Committee was considerably augmented, and now stands at Rs. 1,260. The Collector proposes to spend part of this sum in purchasing and maintaining bulls in different thanas of the district. In acknowledging receipt of a copy of the detailed report of this fair, His Honour the Lieutenant-Governor has commended the personal efforts which have been made by Mr. F. N. Fischer, C.S., Collector of Birbhum, to ensure its success.

115. *Kalimpong Exhibition and Fair.*—The main object of this fair is the improvement of mule-breeding in Sikkim and Tibet, but it is also instrumental in improving the breed of cattle and ponies in the neighbourhood, and is increasing in importance as a stimulus to the agriculturists of the Darjeeling district. The exhibition was held on 30th November and 1st December, and showed an advance on previous exhibitions in the character of the exhibits, especially in those shown in the classes for grains, fruits and vegetables. A number of ponies were bought by visitors to the fair, and nearly 100 mules were purchased by Government for transport purposes, though none were found suitable for ordnance work. This exhibition receives no less than Rs. 1,500 from public funds, the Government Veterinary Department contributing Rs. 500, this Department Rs. 500, and the Darjeeling Improvement Fund Rs. 500. Subscriptions amounting to nearly Rs. 1,000 were also received. Rupees 2,353 were spent by the Committee in the course of the year, a balance of Rs. 428 remaining to the credit of the fair when the accounts were finally closed. It is for political rather than agricultural reasons that the subsidy from this Department is maintained at so high a rate.

116. *The Alipur and Falakata Fairs.*—These small fairs, which are maintained for political reasons, as encouragements to trade between Bhutan and the plains, and not on any grounds connected with agriculture, do not appear to have been quite so successful as usual in the past year. It is estimated that the sales at the two fairs aggregated something under Rs. 10,000. The Government grant of Rs. 500 was expended in sanitary arrangements, the erection of temporary huts, and in providing entertainments of various kinds.

117. *The exhibition at Bera in Pabna.*—This is a show of horses, ponies and cattle which has recently been started with the object of improving the breeds of these animals in the Pabna district. There was but a small number of exhibits this year, and it seems doubtful whether the Committee will be able to collect any large number of cattle together at any time, although the pony and horse races may attract horse-dealers. A sum of over Rs. 2,000 was realised from subscriptions, and the *méla* appears to have been patronised by a fair number of the gentlemen of the district.

118. *Agricultural Exhibition at Rukindipur in Bogra.*—This exhibition has been instituted for the encouragement of agricultural improvements in the district of Bogra generally, and especially in the Jaipur Government estate, within which Rukindipur is situated. The last show was held in December 1898, and appears to have been well attended. A large number of prizes were distributed to exhibitors of sugarcane, jute, paddy and other produce, as well as to those who exhibited articles of local manufacture. The Committee proposes to offer prizes annually to cultivators who can show the best results in the cultivation of new crops, such as Kuch Behar tobacco, Naini Tal potatoes, Buxar wheat, and the like—an excellent suggestion. At present the exhibition appears to be dependent on the Government subsidy of Rs. 200 for funds. Subscriptions should be raised locally in future to supplement that grant, and to enable the Committee to offer more substantial prizes for competition.

119. *The Sonepur Horse and Cattle Fair.*—This well-known fair was held in November last and was largely attended. It was estimated that some 3,000 horses and ponies, 40,000 cattle, 700 buffaloes, and 500 elephants were brought to it. The ponies appear to have shown considerable improvement in quality, but the bullocks are reported to have been below the average. The exhibition which is held annually in connection with the fair does not attract a very large number of entries, though there were more than usual this year. Only Rs. 132

were distributed in prizes, and it would seem advisable to try the experiment of framing a more attractive prize list, of removing the show-yard to the centre of the cattle fair, and of advertising the exhibition more extensively. It is doubtful whether the exhibition can be said to serve a useful purpose unless it leads to a gradual improvement in the class of animals brought to the fair. The fair was visited by Veterinary Major Raymond, who took with him four of his students from the Bengal Veterinary College for purposes of instruction.

120. *Cattle fair at Sitamarhi in Muzaffarpur.*—This fair was held in April 1898, and showed a great falling-off in numbers and in the quality of the animals brought to it. This was attributed to the rumours of precautions to be taken against plague and rinderpest, and the comparative failure was shared by another large cattle fair which is held at about the same time in the neighbourhood, in British territory, while the Janakpur fair, held not far away in Nepal, was reported to have been very largely attended. The exhibition held in connection with the fair was not a great success, but as it is a comparatively recent institution it may be hoped that it will gradually attract more attention and become more popular with the cattle-owners attending the fair. One of the lecturers from the Bengal Veterinary College attended the fair and assisted the local Committee in judging the exhibits.

121. *The Barhampur Cattle and Horse Fair.*—This annual fair was held at Barhampur in the district of Shahabad on the 10th and 11th March 1899, and was well attended, some 5,000 horses and ponies and 25,000 cattle being brought to it. Veterinary Major Raymond attended the fair, and informs me that, although there were more animals than usual brought to the fair, the quality of the horses and bullocks was not above the normal. The exhibition of horses, cattle and agricultural produce organised in connection with the fair was a failure as regards the live stock classes, but showed a very marked improvement on the agricultural side. I have addressed the Collector on the subject of the failure of the Committee to attract the best animals in the fair to the show-yard, and have asked that enquiries may be made as to the real causes of this failure. It is clear that unless there is keen competition for the prizes offered by the Exhibition Committee, the show cannot have much influence on the breed of cattle brought to the fair. As to the exhibition of agricultural produce, Mr. N. N. Banerjei, Assistant Director of Land Records and Agriculture, who visited the fair on my behalf, reports that the number of exhibits was double that of last year and that the quality showed considerable improvement. Mr. Banerjei submitted a full report of the exhibition to me, and made various recommendations for its improvement which have been communicated by me to the Committee. I have no doubt that this exhibition will have some effect in due course in improving the agriculture of the neighbourhood, and I hope that it will be persevered in.

122. *The Tintanga Agricultural Show.*—This is a small show, held in connection with a local *méla*, which has been instituted for the benefit of the tenantry of the Tintanga Government estate in Bhagalpur. It was held in February 1899, and was visited by some 10,000 people, the concourse of visitors and the quantity and quality of the exhibits in the show being reported to show a great improvement on those of previous years. Some Rs. 500 were distributed in prizes for agricultural produce and livestock, and the Deputy Collector in charge of the proceedings reported that the raiyats appeared "well pleased and lively."

123. *The Madhupur Exhibition of Flowers and Agricultural produce.*—This exhibition, which was originally one for flowers, fruit and vegetables only, is becoming more agricultural in character each year, and contained a fair show this year of agricultural produce of various kinds. The promoter, Babu Hem Chundra Mitter, hopes in time to assist in improving the agriculture of the neighbourhood in which he lives by means of this exhibition and of a demonstration farm which he is opening on his estate, and I have permitted my Assistant, Mr. Banerjei, to visit his exhibition and to advise him as to his farm from time to time.

124. *The Cuttack Exhibition of Flowers, Vegetables and Agricultural produce.*—This exhibition has been recently instituted for the encouragement of agricultural improvements in Orissa, and has made a good start. In addition to large entries in the sections devoted to flowers, fruit and vegetables, there

was a promising number of entries in the purely agricultural sections. A travelling overseer of this Department was sent down to the show with a special collection of implements and produce from Bengal for exhibition.

Applications for Patents for Inventions.

125. Nine applications for patents of an agricultural character were received during the year under report from the Government of India, in the Revenue and Agricultural Department, for opinion. Four of these applications were for patents connected with the extraction and treatment of fibres; two were for colouring jute fibre; one for a domestic grinding mill; one for an improved *kodali* or hoe; and one for the treatment of wild cocoons for improving the quality of raw silk. The applications were sent to the Secretary to the Agri-Horticultural Society of India, who obtained the opinions thereon of Mr. H. J. K. Green, Member of the Institute of Civil Engineers, and of Mr. W. R. Criper, Analytical Chemist.

Cost of Miscellaneous Experiments and Enquiries.

126. Excluding the cost of the experimental work done in combating silk-worm disease, the cost to Government of agricultural experiments and miscellaneous enquiries conducted under the direct supervision of the Department of Land Records and Agriculture during the year under report was Rs. 6,155-11-9, against Rs. 8,406-12-7 expended in the preceding year. This excludes the cost of the maintenance of the Sibpur Farm, which has been transferred to the Education Department. The details are as follows:—

				Rs.	A.	P.
(1) Experiments other than those made in experimental farms			...	2,630	11	1
	Rs.	A.	P.			
(*a*) Purchase of seed potatoes	2,000	0	0			
(*b*) Ditto Muzaffarpur seed wheat ...	9	14	0			
(*c*) Ditto Buxar seed wheat ...	9	2	6			
(*d*) Lac experiments	100	6	8			
(*e*) Cowdung experiments	29	7	6			
(*f*) Purchase of other seeds and manures ...	295	15	5			
(*g*) Miscellaneous	185	13	0			
	2,630	11	1			
(2) Pay and travelling allowance of the Agricultural Overseers ...				1,416	12	4
(3) Cost of exhibiting implements and machines at the agricultural shows				83	6	0
(4) Purchase of implements				73	12	6
(5) Cattle-breeding				1,037	12	6
(6) Cost of maps for illustrating the report on the material condition of small agriculturists and labourers of Gaya				93	15	0
(7) Miscellaneous, including Rs. 250, the cost for erecting two Isolation Hospital sheds for the Bengal Veterinary College, and Rs. 60-2-6, the cost for cutting grooves in the floors of the stables at the Bengal Veterinary College				819	6	4
Total ...				6,155	11	9

Increase in the work of the Agricultural Department.

127. Before concluding this report, and by way of apology for its shortcomings, I would venture to remind the Board and Government that there has been a great increase in the work of this Department during the past few years.

Ordinary correspondence has greatly expanded, and the following are some figures of receipts and issues, excluding circulars and demi-official correspondence:—

	Receipts.	Issues.
1885	680	920
1891	3,000	2,000
1898	4,500	6,500

While in the year 1888-89 only seven forecasts of crops had to be compiled, there are now seventeen such forecasts to be prepared, while at the

same time the scope of almost all these forecasts has been increased, and the increasing attention paid to them by the mercantile community renders their preparation a matter of greater labour than formerly.

The returns of agricaltural statistics and the annual report on minerals and gems have been much enlarged in the course of the past few years, and their preparation involves much time and labour, while the compilation of the returns of crop-cutting experiments, which were instituted only five years ago, is also a new and serious task.

Up to the year 1895-96 monographs on the various industries of Bengal were prepared by a special officer. Since then, however, the monographs on 'Dyes and dyeing in Bengal,' and on 'Cotton fabrics,' have been prepared by Mr. N. N. Banerjei of this Department, and a third monograph by this officer on 'Woollen fabrics' is now passing through the press.

The work connected with enquiries under Imperial control, which takes up much of the time of my assistants, has grown up almost wholly within the past few years, and the same remark applies to the collections made for the Imperial Institute, while the work connected with enquiries from private individuals on agricultural matters, and with the supply of seeds, manures and implements has more than doubled since 1891.

At the same time, the establishment of large farms in various localities, and the proposals that are now under consideration for the initiation of experimental or demonstration cultivation on a large scale in various parts of these Provinces involve much work in my office.

Officers of the Department.

128. I have received much valuable assistance throughout the year from Mr. N. N. Banerjei, whose work has been consistently good and accurate. Mr. D. L. Roy has worked hard to master the duties and responsibilities of his new post. My personal Assistant, Mr. Rowland Nagendra Lál Chandra, has given me much useful help on the Settlement side, and in supervision of the office generally.

Mr. Lancaster, Secretary to the Agri-Horticultural Society, has taken much trouble to meet our indents for seeds and plants.

I have also to acknowledge the valuable aid which has been at all times courteously afforded us by Major Prain, I.M.S., Superintendent of the Royal Botanic Gardens, Dr. George Watt, C.I.E., Reporter on Economic Products to the Government of India, and Dr. J. Walter Leather, Assistant Agricultural Chemist to the Government of India.

I have the honour to be,

SIR,

Your most obedient servant,

P. C. LYON,

Director of the Department of Land Records and Agriculture, Bengal.

APPENDIX I.

List of products of which specimens were collected for the Indian Museum, Calcutta, and for the Imperial Institute, London, during the year ending 31st March 1899.

Scientific names of the products supplied.	Vernacular names.	Parts collected	Remarks.
1	2	3	4
Accacia arabica ...	Babul	Gum, bark, twig and 36 articles made of *babul.*	Besides the products shown in this list botanical specimens of 14 economic plants and 2 *hathas* (implements used in irrigation) were also supplied to the Herbarium of the Indian Museum.
Adhatoda vasica ...	Bakas	Roots and leaves ...	
Alastonia scholaris ...	Chatwan ...	Bark	
Andropoghum sorghum ...	Juar	Seed	
Anona squamosa ...	Ata	Bark and seed ...	
Calophyllum inophyllum ...	Polang Urya ...	Fruits and oil ...	
Diospyro embryopteris ...	Gab	Seed	
Melia azadirachla ...	Neem	Flowers	
Piper betel	Pan	Specimens of nine varieties	
Saccharum ciliarum ciliari	Munj	Stems and leaves ...	
Thevetia neriefolia ...	Kalikaful ...	Fruits	
	Krook ...	Leaves and umbrella made of the leaves.	

APPENDIX II.

A list of Agricultural Implements and Machines which have been tested in Bengal during the year ending 31st March 1899, and of those in use which are reported to have met with more or less marked success.

No.	Designation of implement.	Use.	Special advantage or instructions.	Price.	Where procurable.	Name and designation of official reporter.	Opinion.	Extent to which used by native agriculturists.	Remarks by Official Reporter.
1	2	3	4	5	6	7	8	9	10
				Rs. A. P.					
1	Sibpur wrought-iron soil-inverting plough.	Soil-inverting ...	Being made of wrought-iron can be easily repaired. Is a cheap soil-inverting plough.	7 0 0	Agricultural Department, Bengal.	The Commissioners of the Orissa and Patna Divisions and the Manager of Wards' and Encumbered Estates, Ranchi.	.....	.....	The Collector of Cuttack reports that in the Madhupur Ward's Estate in Cuttack, Sibpur ploughs were tested and found to be useful. The Manager of the Narhan Estate (Darbhanga) reports that the Sibpur plough was most appreciated for lightness and efficiency by the raiyats of the Narhan Estate. The Sibpur plough was introduced in the Khurda Estate in Puri during the year. The Manager of the Wards' and Encumbered Estates at Ranchi reports that the Sibpur ploughs were found very useful.
2	Baldeo plough ...	For ploughing	.....	2 0 0	Cawnpore Government Farm.	Commissioner of the Rajshahi Division. The Managers of the Dhenkanal Estate and Narsingpur Estate (Orissa).	.....	.....	Eight Baldeo ploughs were supplied to different jotedars of Jalpaiguri. The Tahsildar of Mainaguri reports that the jotedars appreciate the usefulness of the ploughs, and are of opinion that two ploughings with such an instrument are equal to three or four ploughings with that in ordinary use. The Subdivisional Officer of Alipur, however, reports that the ploughs are too heavy for the local cattle. But even these cheap ploughs are complained of as too expensive. The manager of the Dhenkanal Estate says that it opens up a given area of land in a shorter time and at a greater depth than the local plough. One ploughing with this is as effective as two or three ploughings with the country plough. The Manager of the Narsingpur Estate reports that the raiyats do not seem to appreciate the Baldeo ploughs as they consider them too heavy for their bullocks, and that the ploughs being somewhat narrow can not throw out so much earth as their broad wooden ploughs can.
3	Baldeo improved plough.	Ditto ...	Stronger and more durable than the Baldeo plough.	3 8 0	Ditto ...	Commissioner of the Patna Division.	.....	.....	The weight and the price of the plough are considered by the Manager of the Narhan Estate in Darbhanga to be objections.
4	Mr. W. Martin's patent plough.	For ploughing light soils.	Lightness, cheapness and effectiveness are claimed.	7 0 0	Mr. W. Martin, Naini Tal.	Commissioner of Patna; Agricultural Department, Bengal; Agricultural Lecturer, Sibpur. Civil Engineering College.	.....	.....	(1) The Manager of the Narhan estate reports that the weight and expense of the Martin's plough are considered to be objections. (2) Mr. N. G. Mukherji says that Mr. Martin's plough makes a V-shaped furrow like the country ploughs. It makes irregular furrows, being too jumpy in its movements. The teeth offer too great a resistance. The mould-board is curved too abruptly. It does not in consequence overturn the soil. (3) Mr. D. L. Roy says that the Martin's plough has not been found to work satisfactorily. It jumps out of the ground every now and then and the share merely scrapes the ground. The mould-board does not turn up the furrow. (4) The Overseer of the Dumraon Farm reports that the Martin plough does not invert the soil like the Sibpur iron plough. Of course, it is lighter than the two ploughs (Sibpur and local) now in use on the farm. The mould-board of the plough is very narrow and curved, conse-

									quently it is unable to make wide furrows and to invert the soil. Three ploughings with this (Martin's) plough are equal to two with the Sibpur plough. The plough requires improvement in the construction of its mould-board, so that it may invert the soil, and make wider furrows than it does now.
5	Meston plough ...	Breaking and inverting soils.	Strong, durable, light, cheap, suitable for all kinds of soil, easy of repair and simple of construction.	4 0 0	Government Experimental Farm, Cawnpore.	Agricultural Department, Bengal; Agricultural Lecturer, Sibpur Civil Engineering College, and the Managers of the Kanika Ward's Estate and Pal Lahara Tributary Estate in Orissa.	.....	.....	Mr. N. N. Banerji, Assistant Director of Land Records and Agriculture, reports that the Meston plough was found rather unsatisfactory at Dumraon. On hard soil, it did little more than scrape the land, and on soft loose soil, it scarcely inverted the soil, and in this respect was not found to be superior to the country plough. The furrows made by it were in all cases shallower and narrower than the furrows made by the local country plough. Mr. D. L. Roy, Assistant Director of Land Records and Agriculture, reports that the Meston plough was found to be useful in ploughing light soils, but was found defective in several particulars. It is weak in construction, does not plough deep, and does not efficiently turn the furrow slice. Mr. N. G. Mukherji, Agricultural Lecturer, reports that he finds that the Meston plough is not suitable for the heavy soil of Sibpur. The Overseer of the Burdwan Farm reports that the Meston plough cannot turn the earth like other English ploughs, but is not heavier than the country plough. Every size of bullocks can easily work it, and the ploughman has no difficulty in carrying the plough to the fields. The beam, handle, mould-board and body of the plough are not strong enough. The Overseer of the Dumraon Farm reports that the Meston plough is too weak in its construction. It is very light and consequently does not run steadily through the soil and merely scrapes the ground. The whole body (iron made) is attached to the handle by means of a thin bolt and nut which, if lost, the whole plough will become useless until it (nut) is replaced by another (nut) of the same kind. In villages it is impossible to overcome the difficulty where such things are not available. The Overseer of the Sripur Farm at Hatwa, however, says that the Meston plough is superior to the country plough in inverting the soil to a depth of 6 inches deep, 10 inches wide, and can plough the same area of land in a much shorter time than the country plough. The Manager of the Kanika Ward's estate in Orissa says that the Meston plough was found useful, as the bullocks of this estate which are mostly of small size could easily work it. The Manager of the Pal Lahara Tributary Estate in Orissa says that the Meston plough is not suitable for breaking up hard soils.
6	Watts' chain plough	Inversion of soil and ploughing heavy soils.	Easy draught and adaptability to the various modes of preparing the soil.	7 0 0	.....	Agricultural Department.	.....	.....	Was found efficacious on the Burdwan farm in ploughing every kind of soil.
7	"S. S. Preparation plough."	Breaking up the soil before using native ploughs.	Ploughs deeper and is light and cheap.	2 12 0	Messrs. Still and Sealy, Motihari.	Commissioner of the Patna Division.	Works satisfactorily, and is used by all the Indigo Planters.	.....	A few are used by natives.
8	Planet (American hoe).	Hoeing and weeding.	.....	30 0 0	.....	Agricultural Department, Bengal.	.....	.....	This hoe was used and found very useful on the Sibpur and Burdwan Farms.
9	Hoe prepared by the Agricultural Department, Bengal, (Sibpur Hoe.)	Ditto ...	...	9 8 0	Agricultural Department, Bengal.	Agricultural Department, Bengal.	.....	.....	It was used on the Sibpur farm by Mr. N. G. Mukherji, Agricultural Lecturer, Sibpur College, who considers it to be defective and inferior to the American hoe. The Manager of the Dhenkanal estate in Orissa says that it is very useful in clearing the weeds and pulverising the land.

No.	Designation of implement.	Use.	Special advantage or instructions.	Price.	Where procurable.	Name and designation of official reporter.	Opinion.	Extent to which used by native agriculturists.	Remarks by Official Reporter.
1	2	3	4	5	6	7	8	9	10
						Threshing Machines.			
10	Renwick's Patent Behia pattern sugarcane mill.	For crushing sugarcane.	Effective and cheap.	Rs. 35 to Rs. 80.	Messrs. Renwick and Co, of Kushtia, Nadia.	Commissioner of the Presidency Division.	.....	Extensively used in the district of Nadia.	Mr. Renwick's pattern sugarcane mills, and the mills patented by Mr. Sherriff, are in extensive use in the district of Nadia.
11	Behia sugarcane mill.	Ditto ...	Juice can be extracted in a short time with less labour and expense.	Rs. 65 to Rs. 70 for two-roller mills and Rs. 90 for three-roller mills.	Messrs. Thomsen and Mylne of Behia, Shahabad.	The Commissioners of the Patna, Rajshahi, Chota Nagpur, Burdwan and Orissa Divisions and the Collector of Chittagong.	Universally approved.	Extensively used throughout Bengal.	These machines are held in great favour, and are largely used by native cultivators with much success. The manager of the Narsingpur Estate (Orissa) reports that the people appreciate these mills very much, and that there is a great demand for them.
12	Evaporating pan used in making *gur*.	.....	.....	Rs. 35 each	.....	Agricultural Department, Bengal.	.....	.....	The Behia shallow pan was tried in the Burdwan farm for making *gur*, but the raiyats have not yet adopted it, as they say it is a little more expensive to boil the juice in this pan than in the country pan.
13	Spraying bellows ...	.....	.....	Eclair vaporiser, Rs. 50. American spraying bellows, Rs. 5 each.	.....	Ditto ...	.....	.....	The Eclair Vaporiser and American spraying bellows were used in the Sibpur farm for applying insecticides and fungicides, and gave satisfaction. The bellows were also used by Mr. N. N. Banerjei in connection with his enquiry about the insect pests in the Backerganj district and were favourably reported on.

APPENDIX III.

List of Seeds, Implements, Manures, etc., distributed by the Department, during the year 1898-99.

	Mds.	s.	ch.
Seeds.			
Potatoes	529	20	0
Muzaffarnagar wheat	74	20	0
Buxar wheat	4	0	0
Gram	25	10	0
Maize	10	7	8
Khesari	5	0	0
Peas	5	0	0
Paddy	1	15	0
Cotton	0	35	0
Jute	0	25	0
Ground nut	0	20	0
Indigo	0	15	0
Oats	0	10	0
Castor	0	9	3/4
Lucerne	0	9	0
Carrot	0	5	0
Rai mustard	0	5	0
Sorghum	0	2	12
Radish	0	2	8
Tobacco	0	1	9
Onion	0	1	0
Russian sunflower	0	1	0
Reana	0	8	1/4
Rhea	0	0	3
Cauliflower	0	0	1/2
	Kahan.	Pons.	
Sugarcane cuttings	78	2	
	Value.		
	Rs.	A.	P.
Patal roots	5	0	0
Implements.	No.		
Sibpur ploughs	17		
„ hoes	1		
Meston ploughs	16		
Baldeo do.	14		
Manures.	Mds.	s.	ch.
Castor-cake	150	25	0
Bonemeal	6	0	0
Saltpetre	0	10	0

L. H.—Reg. No. 962J—500—4.8.99.

REVENUE DEPARTMENT.

AGRICULTURE.

DARJEELING, THE 9TH NOVEMBER 1899.

RESOLUTION—No. 952T.R.

READ—

(1) Letter No. 819A., dated the 11th August 1899, from the Board of Revenue, submitting the Report of the Department of Land Records and Agriculture, Bengal, for the year 1898-99.

(2) The Report itself.

Read also—

(3) The Resolution of the Government on the Report for the year 1897-98.

MR. P. C. LYON was in charge of the Department during the whole of the year, and Messrs. Nagendra Nath Banerjee and Dijenlala Roy were the Assistant Directors employed under him. The report was submitted with commendable punctuality.

2. *Chapter II of Report.—Land Records Establishment.*—The brief account given by the Director in his present report of the working of the Land Records Maintenance Act, III (B.C.) of 1895, in the two districts of Muzaffarpur and Champaran, is not of a reassuring nature, and supports the conclusions which he arrived at in the special report submitted by him on the subject in July 1898, that the Act has failed to attain the immediate object for which it was framed, and that any elaborate scheme devised for its working, which does not provide for a periodical revision of the records on the ground, will prove unsuccessful, and lead to unnecessary harassment of the tenantry. The Lieutenant-Governor reserves the issue of final orders on the subject until the whole question is laid before him in a comprehensive form.

3. The Act was in operation, as in the previous year, in the Hajipur and Bettiah thanas, and there were registering offices at Hajipur, Mahnar, and Bettiah. The total number of notices for registration of mutations filed during the year amounted to 3,873, of which 2,061 were voluntarily presented by the parties under section 6, and the remaining 1,812 were prepared by the Registrars of Mutations themselves under the provisions of Rule 5 of the Rules made by Government under the Act, the corresponding numbers of notices filed under these two heads during the year 1896-97 being 4,287 and 1,243, and those during the year 1897-98 being 4,063 and 2,109, respectively. The large decrease in the number of notices filed under section 6 indicates that the raiyats are no longer taking the same amount of interest in the voluntary registration of mutations of their holdings, and the evidence accumulates that a system, which depended on their prompt and faithful report of transfers, will not succeed.

4. The following table compares the number of mutations registered during the year with those registered during the preceding two years :—

Thana.	Office.	Permanent tenures.						Temporary tenures.						Holdings at fixed rates.					
		Transfer.			Succession.			Transfer.			Succession.			Transfer.			Succession.		
		1896-97.	1897-98.	1898-99.	1896-97.	1897-98.	1898-99.	1896-97.	1897-98.	1898-99.	1896-97.	1897-98.	1898-99.	1896-97.	1897-98.	1898-99.	1896-97.	1897-98.	1898-99.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Bettiah ...	Bettiah ...	...	1	...	...	...	...	41	99	10	7	6	...	1	8	...	...	1	...
Hajipur ...	Hajipur ...	1	...	16	...	...	11	...	...	...	...	...	...	329	373	168	35	139	73
Do. ...	Mahnar ...	...	14	24	...	12	40	...	2	...	...	...	2	43	80	49	4	53	45
	Total ...	1	15	40	...	12	51	41	101	10	7	6	2	373	461	217	39	193	118

Thana.	Office.	Occupancy holdings.						Other holdings.						Total number of mutations registered.		
		Transfer.			Succession.			Transfer.			Succession.					
		1896-97.	1897-98.	1898-99.	1896-97.	1897-98.	1898-99.	1896-97.	1897-98.	1898-99.	1896-97.	1897-98.	1898-99.	1896-97.	1897-98.	1898-99.
		21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Bettiah ...	Bettiah ...	1,081	928	260	50	9	5	...	59	22	...	1	...	1,180	1,112	29
Hajipur ...	Hajipur ...	1,176	1,180	764	120	288	285	118	137	68	10	22	27	1,789	2,139	1,41
Do. ...	Mahnar ...	538	1,433	1,370	57	788	1,457	7	88	58	...	69	48	649	2,539	3,09
	Total ...	2,795	3,541	2,394	227	1,085	1,747	125	284	148	10	92	75	3,618	5,790	4,80

The increase in the figures for the Mahnar office is reported to be due to the clearance of heavy arrears during the year under report. The figures for the Hajipur office have considerably fallen, but the Bettiah office shows the worst result of all. Financially, the three offices worked at a net loss of Rs. 1,710 during the year as against a loss of Rs. 895 during 1897-98 and a net gain of Rs. 507 during 1896-97.

5. *Orissa Settlement Records.*—As regards the maintenance of the settlement records in the temporarily-settled estates of Orissa, a draft Bill, based on lines approved by the Government of India, for the imposition of a patwari cess and the creation of a special staff of patwaris and kanungos, together with rules for the working of the entire scheme, has been prepared, but the introduction of the scheme has been postponed pending the consideration of a special report from the Board on the comparative merits of the patwari system and of a periodic local revision of the records.

6. *Maintenance of jamabandis in Government and Wards' Estates*—The year's record of work in the Government and Wards' Estates is, for the most part, one that leaves much to be desired. The number of tenancies in 14 of the Backergunge Government Estates in which mutations were registered, formed 11·4 per cent. of the total number, and this proportion was the highest attained in the province; but even there it is reported that no mutations were recorded in the eight other estates. The explanation of *this* may be sufficient, but it has not yet been offered. There was some increase in the number of mutations registered by the Burdwan Raj, but the local officials unhesitatingly maintain that under prevailing customs occupancy rights cannot be transferred without their consent, an opinion which Government has accepted. The Board have not noticed the Director's suggestion that the returns of this estate as at present prepared are useless and might be discontinued. Since it has been decided that the Manager should not be compelled to give effect to an alleged custom, the existence of which he denies, it would appear that the Director's proposal might be accepted, but the Board are desired to consider and pass orders on this matter. The Manager of the Maldwar Estate is reported to have paid great attention to the maintenance of an

accurate jamabandi; and his efforts, combined with the reduction in the mutation fees, led to a notable increase in the corrections made. Elsewhere there is little in the report of the Director of Land Records of a hopeful character; and though the Lieutenant-Governor is fully aware of the difficulties which beset the question, he is constrained to express his disappointment at the small progress made in the Government estates, where the obstacles to be overcome are least serious. He approves the action taken by the Collector of Backergunge for the improvement of the returns on his Wards' Estates.

In future reports the Director of Land Records should give particulars showing for what percentage of the number of tenants were the rent-rolls examined in the villages concerned by the Collector or his deputies, and the results of such examination as regards the number of transfers which had not been noted in the records or reported by the tahsildars. It is quite certain, from the experience in other provinces, that if such examination be properly conducted, different villages being selected yearly without any previous notice being given, much may be done to improve the present state of things, and all Collectors should understand that this is an important part of the duty of themselves and their subordinates in their winter tours. As soon as the estate officials see that this is done, marked advance will very quickly follow in the maintenance of correct records.

7. *Maintenance of boundary marks.*—The boundary marks which, according to the direction of the Board, it is incumbent on the District Collectors to have inspected, are those which have been erected in connection with cadastral and other surveys which demarcate the boundaries of estates or tenures or of lands which have been the subject of dispute in the course of settlement proceedings. As the Director of Land Records correctly points out, the District Officer can have this work adequately done only in the case of a few of the most important boundary pillars in his district; and anything like a complete inspection of the boundary marks of a district which has been cadastrally surveyed will require a carefully prepared map showing such marks and a special staff. The Lieutenant-Governor awaits the scheme now under the consideration of the Director of Land Records, and meantime is pleased to see that, in the majority of the districts, great attention is devoted to this important matter. The attention of the Commissioner of the Rajshahi Division will be drawn to the remarks concerning this matter which the Director has made about the districts of Jalpaiguri and Bogra.

8. *Chapter III.—Utilisation of Land Records.*—The Lieutenant-Governor has read with much interest the remarks which the Director of Land Records has made on this subject, and though acknowledging that strictly speaking this chapter is reserved for a description of the work of a land records staff, provision for which does not at present exist in these provinces, he will be glad if the Director of Land Records will in future reports continue to show, as he has done in this, what use, so far as he can judge, has been made for administrative purposes of the record-of-rights of these districts which have been wholly dealt with. Rules requiring that in such districts the identification of lands referred to in deeds presented for registration shall take the form of a reference to the survey maps are under consideration.

Recently the Lieutenant-Governor's attention has been drawn to a remarkable decrease in the number of rioting cases in Muzaffarpur, due in part to an intelligent use, initiated by Mr. Hare in the Criminal Courts there, of the district record-of-rights, and His Honour will cause the District Magistrates who are concerned to be consulted as to the advisability of general instructions to Magistrates drawing their attention to the value of the record-of-rights in all cases dealing with land disputes. Subsequently it may be necessary to ascertain to what extent these instructions are being complied with.

9. *Chapter IV.—Scientific and National Enquiry under Imperial Control.*—The examination of various kinds of leguminous crops which was undertaken by Major Prain, I.M.S., during the year 1897-98 was finished during the year under report, but his report on the result of his investigation has not yet been

published. The botanical examination of the varieties of *betel leaf* and *sola* which Dr. G. Watt, C.I.E., Reporter on Economic Products, has been making since the years 1896-97 and 1897-98, respectively, with the help of the Agricultural Department, was in progress throughout the year. His report on the result of his investigation into the causes of the outbreak of betel-nut plague in East Bengal during the years 1895-96 and 1896-97 has not yet been received. Enquiries about *juar*, jute, *rhea*, and *dal* were also made during the year.

10. At the instance of the Government of India, enquiries were instituted during the year by this Government through the Agricultural Department into (1) the extent of the occurrence of sugarcane disease and the remedial measures adopted, and (2) the effects of the increasing imports of refined sugar from foreign countries, on the cultivation of sugarcane and the profits from the sugar industry. No definite conclusion has been arrived at as to whether the disease due to *Trichosphœria sacchari* exists in these provinces, though it has been ascertained that the crop so far is not affected to any serious extent. The enquiries made on the second point pointed to the following conclusions:—

(1) That the importation of foreign sugars had greatly reduced the price of refined sugars in the Indian market.

(2) That the Indian sugar-refining industry had been much injured by this reduction in price, that a large number of refineries have been closed, and that the remaining ones were mostly working at a loss.

(3) That the price of unrefined sugars, known as *gur* and *rab*, had not on the whole fallen.

(4) That mainly on account of the demand for raw sugar the area under sugarcane cultivation and the profits derived from that cultivation have not diminished in the past few years.

11. *Chemical analyses of soil-water, &c.*—The services of Dr. J. W. Leather, the Assistant Agricultural Chemist to the Government of India, were utilised during the year in connection with the chemical analyses of different specimens of soils obtained from certain selected districts in East Bengal and the Orissa Division, as well as of soils impregnated with *reh* in certain tracts of the North Bihar districts. Enquiries were also made regarding the supposed injurious effects of irrigation in the districts of Darbhanga, Muzaffarpur, and Champaran, where the belief is widely prevalent that certain kinds of soil, if once irrigated, must always be irrigated. The Lieutenant-Governor trusts that, as funds are available, efforts may be made to throw more light on this important question.

12. *Working of the Civil Veterinary Department.*—A separate Resolution, No. 2630, dated the 8th August 1899, has been recorded by this Government on the annual progress report of the Civil Veterinary Department, Bengal, for the year 1898-99.

13. *Experimental farms.*—As already remarked in the Government Resolution recorded on the last year's annual report, the Sibpur farm was utilised during the year as a demonstrative farm for the practical training of the students of the agricultural classes attached to the Engineering College at that place. As an experimental farm, it does not appear to have achieved results of much importance. In the Burdwan and Dumraon farms almost the same series of experiments which had been conducted during the year 1897-98 were repeated during the year under report, with identical results in most cases. As in the previous year, the experimental cultivation of paddy, sugarcane, maize, *juar*, and potatoes was tried at Burdwan, and of paddy, wheat, potatoes, maize, and *bajra* in the Dumraon farm. The trials with different varieties of sugarcane and wheat in the latter farm proved that the *khari* variety of sugarcane and the Buxar and the Muzaffarnagar (white) varieties of wheat were superior to other varieties of the same crops in regard to productiveness, and it is gratifying to find that the results thus arrived at have been practically endorsed by the neighbouring raiyats. The experiments conducted in the two farms with the Naini Tal potato showed that the method of planting cut sets was more lucrative than when whole tubers were used. As usual, seeds and manures

were distributed during the year from the two farms among the neighbouring cultivators and raiyats of Wards' and Government estates.

14. *Agricultural experiments in Government, Wards', and Private Estates.*—The orders conveyed in the Resolution on the last year's annual report, calling upon managers and officers in charge of Wards' and Government estates to pay increased attention to the introduction of agricultural improvements in estates in their respective charges bore some fruit during the year under report. American maize did well in the Tributary States of Orissa, and potatoes were successfully grown in several districts. Many experiments were failures owing to untimely sowing or unsuitable seed; but such must be expected, for rapid progress in a matter of this kind cannot reasonably be depended on. The Lieutenant-Governor notices with much satisfaction the Director's mention of the names of Mr. Robindra Nath Tagore (who has also shown much enterprise in his silk-rearing experiments), Mr. Pal Chaudhuri, Babu Gauri Sankar Rai, and Babu Charu Krishna Mazumdar. There are few objects to which zamindars of means and leisure can devote their time, with greater pleasure to themselves, and greater profit to their fellow-countrymen, than experiments in the garden and the farm; and it is greatly to be desired that the example which these gentlemen have set should be widely followed.

The record of the experiments made during the year by the Agri-Horticultural Society has been read with interest.

15. *Silk experiments.*—As already remarked in the Government Resolution recorded on the last year's annual report, an important change took place in the management of sericultural operations during the year under report. Until that year the operations were conducted under the immediate control and supervision of the Agricultural Department, Government making a fixed annual grant of Rs. 3,000 for the purpose. Under the new arrangement sanctioned by Government, the entire management and control of the operations, together with the services of the travelling Sericultural Overseer and all sericultural appliances in his hands, were transferred to an independent committee consisting of members who are representatives of the chief silk firms in the Murshidabad district, on their agreeing to spend Rs. 5,000 annually, for a period of three years, for the purpose of teaching M. Pasteur's system of rearing silk-worm to the cocoon-rearers of Murshidabad, Rajshahi, Malda, and Birbhum. In appreciation of the enterprise of the Committee, Government agreed to subsidise it to the extent of Rs. 3,000 annually, on the condition that the subscriptions promised were duly paid in. Operations during the year were confined to the districts of Malda, Birbhum, and Murshidabad. In the first two districts the new system of rearing resulted in an increased produce of cocoons amounting to 50 per cent. and an increase in the selling price of the cocoons of about 60 per cent., results which are highly satisfactory. In Murshidabad the work was commenced too late in the year to show any good outturn. The receipts of the Committee during the year amounted to Rs. 6,332 against an expenditure of Rs. 7,104. Against the deficit of Rs. 772 there was a set-off of Rs. 766, the unrealised value of appliances sold. Considering this to be the first move on the part of persons directly interested in the silk industry of the country towards the adoption of European methods of silk-worm rearing, the Lieutenant-Governor is of opinion that the result of the year's working of the new scheme has been extremely good, and he will watch the progress of this movement with great interest.

16. The progress in the sericultural work of the Rampur Boalia Industrial School was also very satisfactory. During the year Government sanctioned an annual subsidy of Rs. 500 to the school to enable it to send out trained men into the villages for teaching the scientific method of rearing silk-worms. Its financial condition was very prosperous, the figures of receipts and expenditure being as noted on the margin. The success of the school is largely due to the Secretary of the Committee, Babu Akhoy Kumar Maitra, who is reported to have devoted much time and ability to its welfare.

	Rs.
Opening cash balance on 1st April 1898	6,470
Contributions during the year	3,764
Total ...	10,234
Deduct disbursements during the year	3,838
Closing balance	6,396

17. *Chapter VI.—Agricultural education.*—The agricultural classes at Sibpur have now been working for one year, and the results, so far as can be at present judged, though to a certain extent satisfactory, point to the necessity of extending the curriculum. Before passing orders on this point, the Lieutenant-Governor would like to see the results of another year's working of the classes.

18. *Agricultural exhibitions.*—Altogether 12 agricultural exhibitions or shows were held during the year at the places noted on the margin compared with 10 in the preceding year, and Government spent a sum of Rs. 1,670 in the distribution of prizes and certificates. Two of these exhibitions, namely those at Madhupur and Cuttack, were primarily designed for flower shows. The rest, with the exception of the Alipur and Falakata fairs, which are held for political reasons, are cattle and horse fairs, with or without exhibition of agricultural produces. The Suri Cattle and Agricultural show held in January 1899 was conspicuously successful. The Madhupur show is due to the exertions of Babu Hem Chandra Mitra, zamindar, whose efforts to improve the agriculture of his neighbours are to be commended.

(1) Suri.
(2) Kalimpong in Darjeeling.
(3) Alipur } Jalpaiguri.
(4) Falakata }
(5) Bera in Pabna.
(6) Rukindipur in Bogra.
(7) Sonepur.
(8) Sitamarhi.
(9) Berhampore in Shahabad.
(10) Tintanga in Bhagalpur.
(11) Madhupur in the Sonthal Parganas.
(12) Cuttack.

19. *Cost of agricultural experiments.*—The total expenditure from Government funds during the year on agricultural enquiry and improvement (excluding the pay of the superior establishment, the expenditure on silk experiments, the cost of the Civil Veterinary Department, and the cost of maintenance of the Sibpur farm) amounted to Rs. 6,155-11-9 as against Rs. 8,406-12-7 in the preceding year. This apparent decrease is due to the transfer of the Sibpur farm, on which over Rs. 3,000 were spent last year, to the Education Department. The expenditure on seed potatoes has increased from Rs. 250 to Rs. 2,000, and that on cattle breeding from Rs. 200 to Rs. 1,037.

20. *Conclusion.*—The thanks of the Lieutenant-Governor are tendered to Mr. P. C. Lyon for the ability with which he supervised the work of the many branches of the Department during the year. The commendation bestowed by the Director on his Assistant Director, Mr. Nagendra Nath Banerjee, and his Personal Assistant on the settlement side, Mr. Rowland Nagendra Lal Chandra, will be noted by the Appointment Department.

ORDER.—Ordered that the Resolution be published in the *Calcutta Gazette*, and that a copy of it, together with the Report and the forwarding letter of the Board of Revenue, be submitted to the Government of India, in the Revenue and Agricultural Department, and a copy also be forwarded to the Board of Revenue.

By order of the Lieutenant-Governor of Bengal,

F. A. SLACK,

Offg. Secy. to the Govt. of Bengal.

No. 3983.

COPY forwarded to the Secretary to the Board of Revenue, Land Revenue Department, for the information of the Board.

No. 3984.

COPY forwarded to the Director of the Department of Land Records and Agriculture, Bengal, for information.

Nos. 3985-86.

COPY, with a copy of the report, forwarded to the $\frac{\text{Appointment}}{\text{Political}}$ Department of this Government for $\frac{\text{information}}{\text{information and communication to the Inspector-General of Registration}}$.

By order of the Lieutenant-Governor of Bengal,

E. LISTER,

Offg. Under-Secy. to the Govt. of Bengal.

CALCUTTA;
The 15th November 1899.

J. B. K.—Reg. No. 3957C—634—17.11.99.

REPORT

OF THE

DEPARTMENT OF LAND RECORDS AND AGRICULTURE,

BENGAL,

For the year ending 31st March 1900.

Calcutta:

BENGAL SECRETARIAT PRESS.

1900.

Published at the Bengal Secretariat Book Depôt,
Writers' Buildings, Calcutta.

OFFICIAL AGENTS.

In India—

Thacker, Spink & Co., Calcutta.
W. Newman & Co., Calcutta.
Thacker & Co., Bombay.
Higginbotham & Co., Madras.
Superintendent, American Baptist Mission Press, Rangoon.

In London—

E. A. Arnold, 37 Bedford Street, Strand, W.C.
Constable & Co., 2 Whitehall Gardens, S.W.
Sampson Low, Marston & Co., St. Dunstan's House, Fetter Lane, E.C.
P. S. King & Son, 9 Bridge Street, Westminster, S.W.
Luzac & Co., 46 Great Russell Street, W.C.
Kegan Paul, Trench, Trübner & Co., Charing Cross Road, W.C.
B. Quaritch, 15 Piccadilly, W.

On the Continent—

Friedländer & Sohn, 11 Carlstrasse, Berlin.
Otto Harrassowitz, Leipzig.
Karl W. Hiersemann, Leipzig.
Ernest Leroux, 28 Rue Bonaparte, Paris.
Martinus Nijhoff, The Hague.

TABLE OF CONTENTS.

		Page.
CHAPTER	I.—Prefatory	1
CHAPTER	II.—Land records establishment:—Registration of mutations under the Land Records Maintenance Act III (B.C.) of 1895; record of mutations under the rules in Appendix M to the Survey-Settlement Manual, 1895; maintenance of boundary marks . .	1—17
CHAPTER	III.—Utilization of land records	17—18
CHAPTER	IV.—Scientific and national enquiry under Imperial control:—Botanical examination of various leguminous crops; sola (*Æschynomene Indica*); betel-leaf (*piper* betel, *pán*); betel-nut plague in East Bengal; sugarcane disease (*Trichosphæria sacchari*); enquiry regarding the effects of the increasing imports of refined sugar on the cultivation of sugarcane and the profits of the Indian sugar industry; jute; Dioscorea (yams); chemical analyses of soils by Dr. J. Walter Leather; chemical analyses of Indian food-grains and fodder by Dr. J. Walter Leather; saline efflorescence or *reh* in North Bihar; enquiry regarding the supposed injurious effects of well-irrigation in certain tracts in North Bihar; collection of articles for the Indian Museum and the Imperial Institute, London; Bengal Veterinary Department—Cattle-breeding	18—21
CHAPTER	V.—Scientific and local enquiry under Provincial direction:—Analyses of districts; experimental farms; agricultural experiments and the introduction of new and improved staples in Government, wards' and private estates; experiments made by the Agri-Horticultural Society of India; trial of improved agricultural implements in wards', Government and private estates; supply of seeds, manures and implements; crop-cutting experiments by District Officers and Settlement Officers; crop-cuttings in jail gardens; locusts and other insect-pests; sericulture; arboriculture	21—36
CHAPTER	VI.—Agricultural education:—Agricultural classes at Sibpur; The Bengal Veterinary College	36—37
CHAPTER	VII.—Publication of agricultural information	37
CHAPTER	VIII.—Final:—Emigration to Burma; agricultural exhibitions; applications for patents for inventions; cost of miscellaneous experiments and enquiries; officers of the Department	38—42

APPENDICES.

	Page.
I.—A list of the products of which specimens were collected for the Indian Museum, Calcutta, and for the Imperial Institute, London, during the year ending 31st March 1900	i
II.—A list of the agricultural implements and machines which have been tested in Bengal during the year ending 31st March 1900 and of those in use which are reported to have met with more or less marked success	ii—iii
III.—A list showing seeds, implements, manures, etc., distributed by the Department during the year 1899-1900	iv

INDEX.

	Chapter.	Page.	Para.
A.			
Agricultural education	VI	36—37	96—97
Agricultural classes, Civil Engineering College, Sibpur	VI	36	96
Agricultural exhibitions (See under Exhibition)	VIII	38—41	101—114
Agricultural experiments and the introduction of new and improved staples in Government and wards' and private estates	V	26—31	76—85
——— in the Burdwan Division	V	27	77
——— in the Presidency „	V	27	78
——— in the Rajshahi „	V	27—28	79
——— in the Dacca „	V	28	80
——— in the Chittagong „	V	28—29	81
——— in the Patna „	V	29	82
——— in the Bhagalpur „	V	29—30	83
——— in the Orissa „	V	30	84
——— in the Chota Nagpur „	V	30—31	85
Agricultural implements—Trial of—in wards', private and Government estates	V	32—33	87
Agri-Horticultural Society of India—Experiments made by the	V	31—32	86
Analyses of districts	V	21	71
Analyses—Chemical—of soils, by Dr. J. W. Leather	IV	19	65
Analyses—Chemical—of Indian food-grains and fodder by Dr. J. W. Leather	IV	19—20	66
Arboriculture (Date-palms, *Eucalyptus* and *Divi-divi*)	V	36	95
B.			
Betel-leaf (*Piper betel, pán*)	IV	18	59
Betel-nut plague in East Bengal	IV	18	60
Botanical examination of various leguminous crops	IV	18	57
Boundary marks—Maintenance of—	II	12—17	41—52
——— in the Burdwan Division (Hooghly, Burdwan, Midnapore, Birbhum and Bankura)	II	13	44
——— in the Presidency Division (24-Parganas, Murshidabad, Nadia, Jessore and Khulna)	II	14	45
——— in the Rajshahi Division (Rajshahi, Jalpaiguri, Rangpur, Dinajpur, Pabna, Bogra and Darjeeling)	II	14	46
——— in the Dacca Division (Dacca, Backergunge, Mymensingh and Faridpur)	II	14—15	47
——— in the Chittagong Division (Chittagong, Tippera and Noakhali)	II	15	48
——— in the Patna Division (Patna, Gaya, Shahabad, Saran, Muzaffarpur, Darbhanga and Champaran)	II	15	49
——— in the Bhagalpur Division (Bhagalpur, Monghyr, Purnea, Malda and the Sonthal Parganas)	II	16	50
——— in the Orissa Division (Balasore, Cuttack, Puri and Angul)	II	16	51
——— in the Chota Nagpur Division (Ranchi, Hazaribagh, Manbhum, Palamau and Singhbhum	II	16—17	52
C.			
Cattle-breding—Bengal Veterinary Department	IV	20—21	70
Collection of articles for the Indian Museum and Imperial Institute, London	IV	20	69
Crop-cutting experiments by District Officers and Settlement Officers	V	33	89
Crop-cuttings in jail gardens	V	33	90
D.			
Date-palm	V	36	95
Dioscorea (yams)	IV	19	64
Divi-divi	V	36	95

	Chapter.	Page.	Para.
E.			
Emigration to Burma	VIII	38	100
Enquiry—Scientific and national—under Imperial control	IV	18—21	57—70
——————under Provincial direction	V	21—36	71—97
Eucalyptus	V	36	95
Exhibition	VIII	38—41	101—114
——————At Bishnupur in Bankura	VIII	39	105
——————The Suri Cattle and Agricultural	VIII	38	102
——————The Indian Industrial Exhibition in Calcutta	VIII	39	104
——————The Kalimpong—and Fair	VIII	39	103
——————The Alipur and Falakata—and Fair	VIII	39—40	106
——————At Bera in Pabna	VIII	40	107
——————at Rukindipur in Bogra	VIII	40	108
——————at Sitamarhi in Muzaffarpur	VIII	40	109
——————at Berapur in Shahabad	VIII	40	110
——————The Tintanga Agricultural	VIII	40	111
——————of Flowers and Agricultural Produce at Madhupur	VIII	40—41	112
——————of Flowers, Vegetables, and Agricultural Produce at Cuttack	VIII	41	113
——————at Sonepur in Saran	VIII	41	114
Experiments and enquiries—Cost of miscellaneous	VIII	41—42	116
Experiments—by the Agri-Horticultural Society of India	V	31—32	86
F.			
Farms—Experimental	V	21—26	72—75
Farm—Burdwan	V	21—24	73
———-Dumraon	V	24—25	74
———-Sibpur	V	25—26	75
I.			
Inventions—Applications for patents for	VIII	41	115
J.			
Jute (for Imperial Institute, London)	IV	19	63
L.			
Land Records establishment	II	1—17	4—52
——————. Utilization of	III	17—18	53—56
Locusts and other insect-pests	V	33—34	91—92
M.			
Mutations—Record of	II	3—12	12—40
——————.. in the Burdwan Division—in Government estates (Majnamutha, Jalamutha and Pataspur)	II	5	17
——————.. in the Burdwan Division in wards' estates (Burdwan Raj Khas Mahals and Sujamutha)	II	3—4	13
——————.. in the Chittagong Division	II	7—8	25
——————.. in the Chota Nagpur Division—in Government estate (Palamau)	II	7	23
——————.. in the Dacca Division—in Government estates (Backergunge)	II	4—5	14—16
——————.. in the Dacca Division—in wards' estates (Dakhin Shahbazpur)	II	9—10	31—33
——————.. in Noakhali	II	7	25
——————.. in the Orissa Division	II	5—7	18—22
——————.. in the Orissa Division—in Government estates (Banki, Noanand, Birso, Chandbali, Saltgola in Balasore, Kotdes, Kodhar, Balukhand, Khurda and Angul)	II	5—7	18—22
——————.. in the Patna Division (Gaya)	II	7	24
——————.. in the Patna Division (Tikari estate)	II	12	40
——————.. in the Rajshahi Division—in Government estates (Western Duars, Jaipur and the Darjeeling Terai jotes)	II	8—9	26—30
——————.. in the Rajshahi Division—in wards' estates (Maldwar)	II	11—12	37—39

	Chapter.	Page.	Para.
Mutations—Registration of	II	1—3	4—11
——— in North Bihar (Bettiah, Hajipur and Mahnar)	II	1—3	4—9
——— in the Patna Division	II	1—3	4—9
——— in the Chittagong Division	II	3	10
——— in the Orissa Division	II	3	11
O.			
Officers of the Department	VIII	42	117
P.			
Pán (*piper betel* leaf)	IV	18	58
Publication of agricultural information	VII	37	93—99
R.			
Reh or saline efflorescence in North Bihar	IV	20	67
S.			
Sericulture	V	34—36	93—94
Sola (*Æschynomene Indica*)	IV	18	58
Sugarcane Cultivation and Indian Sugar Industry—Effects of the import of refined sugar on	IV	19	62
Sugarcane disease (*Trichosphæria Sacchari*)	IV	18	61
Supply of seeds, manures and implements	V	33	88
V.			
Veterinary College—The Bengal	VI	37	97
W.			
Well-irrigation—Enquiry regarding the supposed injurious effects of—in certain tracts in North Bihar	IV	20	68

DEPARTMENT OF LAND RECORDS AND AGRICULTURE, BENGAL.

No. 2520A.

FROM P. C. LYON, ESQ., I.C.S.,

Director of the Department of Land Records and Agriculture, Bengal,

TO THE SECRETARY TO THE BOARD OF REVENUE, L. P.

Dated Calcutta, the 7th August, 1900.

SIR,

I HAVE the honour to submit the report of the Department of Land Records and Agriculture for the year ending 31st March, 1900. This is the fifteenth annual report that has been submitted by this Department on the subject of the work done under the heads of agricultural enquiry, agricultural experiments, and agricultural improvements.

2. As laid down in the eighth Resolution of the Government of India, Revenue and Agricultural Department, No. $\frac{3}{39-1}$, dated the 20th March, 1897, on the proceedings of the Agricultural Conferences of 1893 and of 1895-96, the report has been divided as follows:—

Chapter I.—Prefatory.
Chapter II.—Land records establishment.
Chapter III.—Utilization of land records.
Chapter IV.—Scientific and national enquiry under Imperial control.
Chapter V.—Scientific and local enquiry under Provincial direction.
Chapter VI.—Agricultural education.
Chapter VII.—Publication of agricultural information.
Chapter VIII.—Final.

CHAPTER I.

PREFATORY.

3. I was in charge of the Department throughout the year under report, except from the 23rd December, 1899, to the 3rd March, 1900, when I was on privilege leave and Mr. S. L. Maddox, I.C.S., officiated for me. A full account of the tours of the Director is given each year in the annual report for the survey and settlement year, which ends on the 30th September.

Messrs. Nagendra Nath Banerjei and Dejen Lala Roy were my Assistant Directors throughout the year.

CHAPTER II.

LAND RECORDS ESTABLISHMENT.

A.—Registration of mutations under the Land Records Maintenance Act, III (B.C.) of 1895.

4. Reference is invited to paragraphs 4 and 5 of my last Annual Report, which deal with the scheme of maintenance embodied in the Land Records Maintenance Act, III (B.C.) of 1895. The special reports which have been submitted by the Commissioner of the Patna Division and myself on the working of this Act are now under the consideration of Government. In the meantime the offices opened for the registration of mutations at Bettiah in Champaran and at Hajipur and Mahnar in Muzaffarpur have been kept open, but no new offices have been started during the year, nor has the Act been extended to any other area. The Inspector-General of Registration has kindly furnished me with a copy of his annual returns regarding these mutation offices, and I notice below the main features of the year's work.

5. The total number of mutations relating to all classes of tenures and tenancies registered during the year amounted to 248 in Bettiah, 1,226 in Hajipur, and 1,802 in Mahnar. Of these, 2,044 were registrations of transfers by sale, and the rest were mostly cases of inheritance. The 2,044 mutations arising out of transfers by sale involved the transfer of 518 whole holdings and

1,526 portions of holdings. These figures are compared with those of previous years in the statement in paragraph 7 below.

6. The total number of notices for registration which were filed amounted to 3,319, of which 1,286 were voluntary presentations by the parties under section 6, and the rest were preferred by the Registrar himself with reference to transfers that had come before him as Registrar of Assurances, in accordance with the provisions of rule 5. The following statement shows the number of notices filed during the past and the previous years :—

Office.	Section 6.				Rule 5.			
	1896-97.	1897-98.	1898-99.	1899-1900.	1896-97.	1897-98.	1898-99.	1899-1900.
1	2	3	4	5	6	7	8	9
Bettiah ...	769	214	17	2	524	855	268	251
Hajipur ...	2,411	1,182	792	561	573	783	639	708
Mahnar ...	1,107	2,667	1,252	723	146	471	905	1,074
Total ...	4,287	4,063	2,061	1,286	1,243	2,109	1,812	2,033

The above shows a still further fall in the figures under section 6, and illustrates the diminishing interest taken by the villagers in the working of the Act. This further failure of the Act to serve the purposes for which it was passed has been anticipated by all the officers who have reported upon its working. Rule 5 notices merely indicate the number of transfers of immoveable property annually registered by the Registrar of Assurances.

7. The following table gives an analysis of the nature of the mutations registered during the past four years:—

Thana.	Office.	Permanent Tenures.								Temporary Tenures.						
		Transfer.				Succession.				Transfer.				Succession.		
		1896-97.	1897-98.	1898-99.	1899-1900.	1896-97.	1897-98.	1898-99.	1899-1900.	1896-97.	1897-98.	1898-99.	1899-1900.	1896-97.	1897-98.	1898-99.
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Bettiah	Bettiah	...	1	...	...	...	...	...	...	41	99	10	8	7	6	...
Hajipur	Hajipur	1	...	16	17	...	...	11	10	...	...	...	...	...	...	...
Ditto	Mahnar	...	14	24	39	...	12	40	42	...	2	...	2	...	...	2
	Total ...	1	15	40	56	...	12	51	52	41	101	10	10	7	6	2

Thana.	Office.	Holdings at fixed rates.								Occupancy holdings.						
		Transfer.				Succession.				Transfer.				Succession.		
		1896-97.	1897-98.	1898-99.	1899-1900.	1896-97.	1897-98.	1898-99.	1899-1900.	1896-97.	1897-98.	1898-99.	1899-1900.	1896-97.	1897-98.	1898-99.
		19	20	21	22	23	24	25	26	27	28	29	30	31	32	33
Bettiah	Bettiah	1	8	...	1	...	1	...	...	1,081	928	260	236	50	9	5
Hajipur	Hajipur	329	373	168	150	35	139	73	58	1,176	1,180	764	694	120	288	285
Ditto	Mahnar	43	80	49	28	4	53	45	22	538	1,433	1,370	1,042	57	788	1,457
	Total ...	373	461	217	179	39	193	118	80	2,795	3,541	2,394	1,972	227	1,085	1,747

Thana.	Office.	Other holdings.								Total number of mutations registered.			
		Transfer.				Succession.							
		1896-97.	1897-98.	1898-99.	1899-1900.	1896-97.	1897-98.	1898-99.	1899-1900.	1896-97.	1897-98.	1898-99.	1899-1900.
		35	36	37	38	39	40	41	42	43	44	45	46
Bettiah	Bettiah	...	59	22	2	...	1	...	...	1,180	1,112	297	248
Hajipur	Hajipur	118	137	68	64	10	22	27	20	1,789	2,139	1,412	1,226
Ditto	Mahnar	7	88	58	51	...	69	48	36	649	2,539	3,093	1,802
	Total ...	125	284	148	117	10	92	75	56	3,618	5,790	4,802	3,276

8. In all the registration offices the number of mutations registered has materially decreased as compared with the numbers registered in previous years, and the most marked decrease is shown in the figures under the heading 'Succession,'—a sure index of the failing interest of the people in the proceedings of the Registrar. The following table shows the percentage given by the transfers registered during the past four years. It may be said that changes in from 8 to 10 per cent. of the holdings recorded probably occur in the course of each year:—

Thana.	Percentage of mutations to number of holdings.			
	1896-97.	1897-98.	1898-99.	1899-1900.
1	2	3	4	5
Bettiah	2·22	2·09	·56	·47
Hajipur, including Mahnar	1·76	3·37	3·25	1·35

9. The total expenditure incurred during the year was Rs. 3,247, of which Rs. 1,112 were [illegible]t in the Bettiah office, Rs. 968 in the Mahnar office, and Rs. 1,167 in the Hajipur office. The total receipts amounted to Rs. 1,514, which were thus distributed—Rs. 13 in the Bettiah office, Rs. 978 in the Mahnar office, and Rs. 523 in the Hajipur office. The deficit of Rs. 1,733 was borne by Government. The deficit in 1898-99 amounted to Rs. 1,710.

10. Final orders have not yet been passed as to the system to be adopted for the maintenance of the records in Chittagong.

11. The report regarding the scheme for the maintenance of the records in Orissa, referred to in paragraph 14 of my last Annual Report, was submitted with my letter No. 1443S., dated 4th August, 1899, and some further information called for by Government as to the experience gained in other provinces in the matter of the periodical revision of maps and records has been recently forwarded to the Board.

B.—Record of Mutations under the rules in Appendix M to the Survey-Settlement Manual, 1895.

12. Action has been taken to give effect to the wishes of Government as expressed in paragraph 6 of its Resolution No. 952T.R., dated 9th November, 1899, on the Annual Report of this Department for the year ending with the 31st March, 1899. To secure better results in mutation work it was suggested that the Director of Land Records should give particulars showing for what percentage of the number of tenants, rent-rolls had been examined by the Collectors or their Deputies during the year, and the results of such examination as regards the number of transfers which had not been noted in the records or reported by the tahsildars. In my circular No. 2157—59, dated 19th December, 1899, the attention of the Commissioners of the Dacca, Orissa and Rajshahi Divisions, within whose jurisdiction most of the estates lie, was invited to these orders, and their assistance was solicited to enable me to carry them out. From the reports received from the local officers it appears that little could be done in the past year, as the orders were received too late to enable district officers to arrange to do much inspection work of the kind suggested before the close of the year. Action will be duly taken to give effect to them during the current year.

13. In the following paragraphs an account has been given of the mutation work done during the year in the Government and Wards' estates which have been surveyed and settled in past years under the supervision of the Director of Land Records. The number of mutations recorded, its percentage to the total area and to the total number of tenancies, together with the percentage of mutations recorded in previous years, have been shown in each case. The estates belonging to the Burdwan Raj, viz., Kujang in Cuttack, Sujamutha in Midnapur, and the khas estates in Burdwan, have been excluded from this report, as the preparation and submission of mutation returns have been

discontinued in accordance with the Board's orders conveyed in their memorandum No. 385A, dated 4th December, 1899. In this connection reference may be made to paragraphs 42 to 44 of my last Annual Report and to paragraph 6 of the Government Resolution upon it.

I.—Government Estates.

DACCA DIVISION.

District Backerganj.

Number of estates	21
Total area	87,808 acres.
Total number of tenancies	11,657

14. The total number of Government estates is 171, of which only 21 have as yet been surveyed and settled under the Tenancy Act. Mutations were actually recorded in 18 estates only, but in calculating percentages the total number, viz., 21, has been taken into account. The subjoined table represents the number of mutations recorded during the year, the number of tenancies affected and the area covered by them:—

Cause of mutation.	Number of mutations.	Number of tenancies transferred—		Area in acres transferred.	Average price per acre of land transferred.
		In whole.	In part.		
1	2	3	4	5	6
					Rs.
Sale	440	10	430	2,985	70
Inheritance	351	155	196	7,020	
Partition	...	...	...	...	
Gift	...	...	...	...	
Total ...	791	165	626	10,005	

15. The number of mutations recorded during each of the past four years and the percentage borne by that number to the total number of tenancies and the total area are shown in the table below:—

Year.	Number of mutations.	Percentage of mutations on—		Average area in acres covered by a transfer.
		Total number of tenancies.	Total area.	
1	2	3	4	5
1896-97	96	8·4	8·1	36·8
1897-98	127	7·32	15·94	53·5
1898-99	209	11·4	15·4	36·2
1899-1900	791	6·8	11·4	12·6

It is difficult to make any profitable comparison between the record of the past and of previous years. Two large estates were included for the first time, and mutation work has not yet been fully organised in them. The figures may be said to be satisfactory on the whole.

The local officers examined about 3 per cent. of the rent-rolls with the object of finding out the number of transfers which had not been noted in the records or reported by the tahsildars. Considering how late the orders on this point were received, this was a good beginning.

16. There were 37 vacant tenancies with an aggregate area of 1,627 acres to be resettled. Some of them were resettled in whole, and in some the cultivated land was divided into small holdings and resettled as such. The total area resettled is 194 acres. Pasturage fees are being realized from the unsettled portions of these tenancies. Sixty new tenancies with an area of

913 acres, created out of waste lands, were settled subject to the condition that no rents will be taken for the first two years, after which an assessment will be made of the lands brought under cultivation as ascertained by measurement every two years.

BURDWAN DIVISION.

17. There is nothing to add to what was stated in paragraph 26 of the last Annual Report regarding the Majnamutha, the Jalamutha and the Pataspur estates in the Midnapore district.

ORISSA DIVISION.

Banki in *Cuttack* ...	Area	74,800 acres.
	Tenancies	20,053
Noanand, Birso, Chandbali and salt gola in *Balasore.*	Area	17,900 acres.
	Tenancies	6,404
Kotdes, Kodhar and Balukhand in *Puri.*	Area	116,400 acres.
	Tenancies	15,244
Khurda in *Puri* ...	Area	565,350 acres.
	Tenancies	176,753
Angul	Area	408,850 acres.
	Tenancies	28,579

18. In Banki the correction of the records is still proceeding, and the Board have sanctioned the continuance of the establishment required for the purpose for another year, 1900-1901, unless it is eventually decided to stop the work. The question of the revision of the existing rules regarding the maintenance of the record was dealt with during the past year. The Collector, Mr. Carey, went into the subject fully and submitted his views thereon, together with a revised version of the rules drawn up in accordance with his suggestions. I had opportunities of discussing the subject locally during my inspection tours, and my report on the subject was addressed to the Commissioner in my letter No. 1663 S., dated 7th September, 1899. I understand that the present Collector, Mr. J. L. Herald, I.C.S., has recently sent in a further report on the subject, and that the rules are now under the consideration of the Board.

Of the estates in Balasore mentioned above, Noanand and Birso were taken up for mutation work about the end of the year 1898-99, and the other two were taken up in the latter part of the year under report.

Kotdes, Kodhar and Balukhand in Puri are recusant estates very recently brought under *khas* management. Very little more than mere preparation for the record of mutations could be done during the year. Proper returns may be expected for the current year.

The maintenance of records in Khurda also came under consideration during the past year. Mr. Stevenson, the late Commissioner, suggested that one set of mutation rules should be prescribed for Angul, Banki and Khurda, and he submitted his views on the subject in his letter No. 874 R., dated 6th May, 1899. The matter having been treated at some length by the Settlement Officer, Mr. Maddox, and the Assistant Settlement Officer in charge of the Khurda settlement, Mr. Taylor, in the Khurda Final Report, it has been decided that the local officers should submit a complete report after due consideration of the remarks made and the suggestions offered in the Final Report. The report of the local officers is now awaited. In the meanwhile mutations are being recorded under the rules that were in force before the settlement.

In Angul the rules for the maintenance of the records are under revision. After I had discussed the matter locally with the Deputy Commissioner, the latter submitted a revised copy of the rules, together with some remarks upon them, in June, 1899. The revised rules were examined by me, and I have submitted my views on them to the Commissioner.

19. As regards the examination of rent-rolls, the following extracts from the Commissioner's report will show the action taken during the year:—

"..... it is reported by the Collector of Balasore that the Deputy Collectors at the Sadar and at Bhadrak examined altogether the rent-rolls of seven villages, containing 532 tenants, forming about 8 per cent. of the total number of tenants. The statistics of examinations of unrecorded transfers have not been supplied. The Collector's attention will be invited to this matter.

"The Collector of Puri does not report the results of the examination of the rent-rolls in Khurda. He has issued instructions pushing on the record of mutations, and this matter

is also having his attention in regard to the recusant estates in the Sadar subdivision . . . . . The Collector of Cuttack is silent on the subject of examination of rent-rolls. His special attention is being drawn to this matter.

"In regard to the above three districts the rent-rolls are, I think, fairly up to date owing to the recent settlement of rents, but it is none the less necessary that the subject should in future receive the earnest attention of the District Officers, in order that the rent-rolls may not become obsolete. It is satisfactory that the Deputy Commissioner of Angul and his Deputy have examined the rent-rolls of all the tenants in 158 villages each, while the Sub-Deputy Collector examined the rent-rolls of six villages. The rent-rolls were found correct by the Deputy Commissioner. The question of unreported mutations will receive the earnest attention of the Deputy Commissioner and his assistant during the next year."

20. The year's work is embodied in the following table:—

Cause of mutation.	Name of estate.	Number of mutations.	Number of tenancies transferred.		Area in acres transferred.	Average price per acre of land transferred by sale.
			In whole.	In part.		
1	2	3	4	5	6	7
Sale ...	Banki	1,216	176	1,040	612	
	Noanand, Birso, Chandbali and salt gola.	101	25	76	141	Rs. 36.
	Angul	23	23	...	62	19 times the rent.
	Kotdes, Kodhar and Balukhand.	6	2	4	5	Rs. 60.
	Khurda	6,055	1,685	4,241	3,625	Rs. 119.
Succession ...	Banki	1,149	816	333	1,658	
	Noanand, Birso, Chandbali and salt gola.	37	31	6	87	
	Angul	1,137	1,137	...	5,855	
	Kotdes, Kodhar and Balukhand.	...	...	...	...	
	Khurda	67	102	70	557	
Partition ...	Banki	207	18	189	126	
	Noanand, Birso, Chandbali and salt gola.	11	11	...	12	
	Angul	24	24	...	359	
	Kotdes, Kodhar and Balukhand.	...	...	...	...	
	Khurda	...	...	...	...	
Gift ...	Banki	4	3	1	1	
	Noanand, Birso, Chandbali and salt gola.	3	3	...	29	
	Angul	...	...	...	...	
	Kotdes, Kodhar and Balukhand.	...	...	...	...	
	Khurda	13	18	12	40	

21. The following is a comparative statement of the results of the mutation work done in the preceding year and that done in the year under report:—

Name of estate.	Year.	Number of mutations.	Percentage of mutations on—		Average area in acres covered by a transfer.
			Total number of tenancies.	Total area.	
1	2	3	4	5	6
Banki	1898-99	14,032	70	18·6	About 1 acre.
	1899-1900	2,576	12·8	3·2	Ditto.
Noanand, &c. ...	1898-99	79	1·25	·53	1·2 acre.
	1899-1900	152	2·4	1·5	1·7 „
Angul	1898-99	875	3·06	1·2	6 „
	1899-1900	1,184	4·16	1·5	5·3 „
Khurda	1898-99	1,064	·6	·14	·7 „
	1899-1900	6,135	3·4	·74	·68 „

The figures for Banki are incorrect, all changes made during the proceedings for the correction of the khasra having been recorded as mutations. The figures for the other estates show some improvement in the past year.

22. In Khurda one vacant tenancy with an area of 8·47 acres was resettled and 254 new tenancies, with an area of 243 acres, created out of waste lands, were settled at settlement rates. In Angul 42 vacant tenancies with an area of 130 acres were resettled, and 123 new tenancies with an area of 509 acres were settled at settlement rates. In Banki one vacant tenancy with an area of ·38 acres was resettled out of 20 vacant tenancies with an aggregate area of 27·98 acres. There were also 92 new tenancies with an area of 39·70 acres, creaetd out of waste lands, settled during the year at rates prevailing in the villages in which those lands lie.

CHOTA NAGPUR DIVISION.

23. The only estate for which mutation returns are to be submitted is the Palamau Government estate, the survey and settlement of which was completed in 1896-97. The proposals submitted for the correction of the records and their annual maintenance have been approved by Government. The Deputy Commissioner has been taking steps to carry out the Government orders. A report is due from him on the subject, and also with regard to the rules to be framed for the guidance of the officials to be employed in the work of reporting and of recording mutations. The rules will be submitted in due course for approval.

PATNA DIVISION.

District Gaya.

Total area	... ...	...	65,274 acres.
„ number of tenancies	... ...	...	6,208

24. Only one half-yearly return has been received for these estates. It covers the half-year ending with the 31st March last, and shows that 75 mutations were recorded—26 arising out of sale, 45 caused by succession, and 4 by partition. The total number of tenancies affected is 75, with a total area of 258 acres. The Collector has been requested to submit in future mutation returns for each half-year. He will be asked to adopt the revised forms of Mutation Registers I to V and of Mutation Return IIA, approved in the revised Survey and Settlement Manual now under issue.

CHITTAGONG DIVISION.

Noakhali.

Estate Badu-Lakhi	...	Area ...	...	21,386 acres.
		Tenancies ...	...	1,334
„ Char Rahim	...	Area ...	...	5,582 acres.
		Tenancies ...	...	382
„ Bharat Sen	...	Area ...	...	3,335 acres.
		Tenancies ...	...	187

25. The following is the record of the year's work in the above-mentioned estates, in which settlement operations have been completed and mutation work introduced:—

Name of estate.	Cause of mutation.	Number of mutations.	Number of tenancies affected.	Area in acres transferred.	Remarks.
1	2	3	4	5	6
Badu-Lakhi ...	Sale ...	24*	20*	265	
	Inheritance ...	9	9	100	
	Partition ...	...	...	...	
Rahim ...	Sale ...	7	7	47	
	Inheritance ...	4	4	23	
	Partition ...	...	...	...	
Bharat Sen ...	Sale ...	1	1	129	
	Inheritance ...	6	6	78	
	Partition ...	...	...	...	
	Total ...	51	47	643	

* The difference between the figures in columns 3 and 4 is due to one tenancy having been transferred more than once.

It is understood from the Collector's report that mutations on account of inheritance are recorded on the application of the tenants. To this may be attributed the small number of mutations of this class shown in his returns. His attention has been invited to the possibility of many such mutations escaping registration and the maintenance of the record consequently failing, if the tahsildars do not make enquiries to detect changes at the time of their visits to the villages. His attention has also been invited to the orders of Government conveyed in the sub-paragraph of paragraph 6 of its Resolution No. 952 T.R., dated 9th November 1899, with regard to the inspection of rent-rolls, in order to detect mutations which have not been recorded by the tahsil establishment.

RAJSHAHI DIVISION.

The Western Duars estate in *Jalpaiyuri.*	Number of jotes 9,971—Area 256,607 acres.	
	Number of subordinate (*chukani*) holdings 11,176—Area 128,288 acres.	
The Jaipur estates in *Bogra* ...	Tenancies	6,544
	Area	28,233 acres.
The Darjeeling Terai estate...	Tenancies	834
	Area	124,376 acres.

26. The following table represents the work done during the year. In the case of the Western Duars the number of mutations affecting jotes has been separated from the number affecting *chukani* holdings, in order that the percentages may be calculated separately. This is desirable because the number of recorded mutations of *chukani* holdings is nominal, such mutations being registered only on the voluntary application of the *chukanidars* :—

Name of estate.	Cause of mutation.	Number of mutations.	Number of tenancies transferred—		Area in acres transferred.	Average price per acre of land transferred.
			In whole.	In part.		
1	2	3	4	5	6	7
The Western Duars estates in Jalpaiguri. — Jotes ...	Sale ...	772	345	366	17,468	In Mainaguri Rs. 40.
	Inheritance ...	431	171	235	7,951	In Falakata Rs. 15.
	Partition ...	12	...	7	1,419	In Alipur and Ambari Rs. 4.
	Gift ...	16	1	13	103	
— Chukani holdings.	Sale ...	26	20	6	318	
	Inheritance ...	14	11	3	199	
	Total ...	1,271	548	630	27,463	
The Jaipur estates in Bogra.	Sale ...	85	80	5	364	Rs. 20.
	Inheritance ...	8	1	7	50	
	Partition ...	...	...	...	...	
	Gift ...	5	4	1	8	
	Total ...	98	85	13	422	
The Darjeeling Terai estate.	Sale ...	161	19	142	7,037	Rs. 13.
	Inheritance ...	117	14	103	5,304	
	Partition ...	...	...	...	...	
	Gift ...	3	...	3	57	
	Total ...	281	33	248	12,398	

Note.—The apparent difference in some cases between the figures in column 3 and the totals of columns 4 and 5 is due to several jotes having been transferred in part more than once.

27. The following is a comparative statement of the results of mutation work during the year under report, as compared with those of the previous year:—

Estate.	Year.	Mutations.	Percentage of mutations on total—		Average area in acres covered by a transfer.
			Number of tenancies.	Area.	
1	2	3	4	5	6
Western Duars...	1897-98 ...	1,025	4·84	4·74	23·3
	1898-99 ...	974	4·60	4·46	23·1
	1899-1900 ...	1,231*	12·3	10·5	22
Jaipur estates ...	1898-99 ...	68	1·04	·79	3·3
	1899-1900...	98	1·4	1·5	4·3
The Darjeeling Terai.	1898-99 ...	14	1·7	·69	62
	1899-1900...	281	33·7	10	44

* Only mutations affecting jotes taken into account.

The figures show some slight improvement, but we probably fail to record a large number of the annual mutations.

28. As regards the examination of rent-rolls for the detection of omitted mutations, the Commissioner offers the following remarks:—

"The jotedar's register of mutations in the Government estates in Jalpaiguri is reported to have been thoroughly inspected by the Settlement Officer. The Deputy Commissioner of Darjeeling reports that the Subdivisional Officer of Kurseong, who was directed to check 5 per cent. of the mutations in comparison with the rent-rolls as regards the Terai jote khas mahals, was unable to do anything in this connection owing to census enquiries in the Kurseong thana. Mr. Kealy, Assistant Collector of Darjeeling, inspected 11 out of the 17 West Teesta khas mahal blocks, bringing to light many cases of omission and irregularity which are being attended to."

29. The draft rules for the maintenance of the records in the Jaipur estates, which were drafted by the Manager under the personal instructions of the Collector and myself, have been approved by Government with some small alterations, and will now be introduced.

30. As to vacant tenancies, it appears that there were 57 such tenancies with an aggregate area of 1,369 acres in the Western Duars, of which 42 tenancies with an aggregate area of 1,014 acres were resettled. In the Jaipur estates in Bogra there were 24 vacant tenancies with an area of 56 acres, and they were all resettled during the year. Two hundred and ninety-nine new holdings with an area of 10,362 acres, created out of waste lands, were settled in the Western Duars—some at pargana rates, some according to settlement rules, and some according to the waste land rules. In the Jaipur estates 47 new tenancies, with an area of 73 acres, created out of waste lands, were settled. From the Darjeeling Terai no report was received showing the number of vacant tenancies and the number resettled. Neither was any information submitted with regard to the number of new tenancies created out of waste lands, which were settled during the year.

II.—Wards' Estates.

DACCA DIVISION.

The Dakhin Shahbazpur estate in Backerganj.

Area	...	...	...	93,298 acres.
Number of tenancies	...	...	...	30,125

31. The year's work is embodied in the following table:—

Cause of mutation.	Number of mutations.	Number of tenancies transferred—		Area in acres transferred.	Average price per acre of land transferred.
		In whole.	In part.		
1	2	3	4	5	6
					Rs.
Sale	371	91	176	341·36	45
Inheritance ...	838	162	223	564·93	
Partition ...	.....	.....	.....	.....	
Gift	5	2	2	7·00	
Total ...	1,214	255	401	913 29	

32. The following is a comparative statement of the results of mutation work during the past and the two preceding years:—

Year.	Number of mutations recorded.	Percentage of mutations on total—		Average area in acres covered by a transfer.
		Number of tenancies.	Area.	
1	2	3	4	5
1897-98	508	1·65	1·07	2·02
1898-99	357	1·05	·56	1·5
1899-1900	1,214	4·03	·98	·76

The figures returned this year show a considerable improvement in the record of mutations, when compared with the work done in the two previous years, due mainly to the personal exertions of the Collector for the enforcement of the rules, but better results may be expected next year, when the Government orders regarding the inspection of the rent-rolls are more fully carried out.

33. It is reported that there were no vacant tenancies for resettlement during the year. The new holdings settled during the year numbered 44, with an aggregate area of 50 acres.

ORISSA DIVISION.

District Cuttack.

Kanika ...	Area ...	...	281,478	acres.
	Tenancies ...	...	30,980	
Madhupur ...	Area ...	...	51,643	acres.
	Tenancies ...	...	24,125	

34. The record of the year's work is as follows:—

Name of estate.	Cause of mutation.	Number of mutations.	Number of tenancies affected.	Area in acres affected.
1	2	3	4	5
Madhupur	Sale	6	14	30
	Inheritance ...	5		
	Partition ...	2		
	Gift	1		
	Total ...	14	14	30
Kanika	Sale	480	480	735
	Inheritance ...	752	752	2,879
	Partition ...	24	24	218
	Gift	2	2	3
	Total ...	1,258	1,258	3,835

The figures for Madhupur are altogether inadequate, and further enquiries are being made as to the cause of the failure of the management to record actual changes that have occurred. It appears that out of 480 holdings affected by sale in Kanika, 171 were whole holdings. The average price per acre of land transferred in Kanika is Rs. 16, but the price per acre of land transferred in the Madhupur estate has not been reported. Nothing has been stated as to the action taken to carry out the Government orders regarding the inspection of rent-rolls with a view to detect omitted mutations.

35. The table below gives a comparative statement of the results of mutation work in Kanika during the period 1896-97 to 1899-1900, and in the Madhupur estate during 1898-99 and 1899-1900 :—

Name of estate.	Year.	Number of mutations.	Percentage of mutations on total—		Average area in acres covered by a transfer.
			Number of tenancies.	Area.	
1	2	3	4	5	6
Kanika ...	1896-97	1,520	4·90	1·99	3·69
	1897-98	755	2·43	·66	2·48
	1898-99	1,132	3·65	1·24	3·08
	1899-1900	1,258	4·06	1·4	About 3 acres.
Madhupur ...	1898-99	4	·016	·03	„ 4 „
	1899-1900	14	·058	·057	„ 2 „

36. In the Kanika estate there were no vacant tenancies for resettlement. In the Madhupur estate only one such tenancy was resettled. In the former estate 1,716 new tenancies with an area of 4,993 acres were settled at settlement rates; in the latter estate it is reported that no new holdings were settled during the year.

Rajshahi Division.

The Maldwar Estate in Dinajpur and Purnea.

Area ... ... 88,329 acres.
Tenancies 10,837

37. The record of the work done during the year stands as follows:—

Cause of mutation.	Number of mutations.	Number of tenancies transferred—		Area in acres transferred.	Average price per acre of land transferred.
		In whole.	In part.		
1	2	3	4	5	6
Sale	93	84	9	1,461	Rs. A. P. 10 2 6
Inheritance ...	400	400	...	5,242	
Otherwise ...	35	35	...	271	
Total ...	528	519	9	6,974	

38. The following table shows the results of mutation work done during 1896-97 to 1899-1900 :—

Year.	Number of mutations.	Percentage of mutations on total—		Average area in acres covered by a transfer.
		Number of tenancies.	Area.	
1	2	3	4	5
1896-97 ...	5	·04	·04	8
1897-98 ...	130	1·2	·96	7
1898-99 ...	671	6·2	4·4	6
1899-1900 ...	528	4·9	7·9	13

The Manager reports that 10 per cent. of the entries in the rent rolls were examined during the year.

39. Only 67 vacant tenancies, with an area of 189 acres, were resettled out of a total number of 796 such tenancies, with an area of 3,806 acres, no explanation has been offered of the figures. Sixty-seven new tenancies, with an area of 166 acres, were settled out of waste lands.

PATNA DIVISION.

The Tikari estate in Gaya.

Area	...	...	...	45,139 acres.
Holdings	...	...	...	11,269

40. A half-yearly mutation return in form No. $\frac{II}{A}$ for the half-year ending with the 31st March last has been received, showing that the following mutations were recorded:—

By sale	...	...	...	1,264
„ succession	...	...	...	463
„ partition	...	...	...	279
				2,006

The number of tenancies affected is 2,006, with an aggregate area of 4,373 acres and 12,528 fields. The Manager has been requested to report the number of tenancies transferred in whole and the number transferred in part, but his reply has not been received. In future he will be asked to submit for each half-year the three mutation returns $\frac{II}{A}$, $\frac{III}{A}$, and $\frac{IV}{A}$ in the forms prescribed by the Board. The following quotation from the Manager's report will show the action taken by him in connection with mutation work in the estate:—

"During the cold weather the Manager has made personal enquiries and investigations in almost every village, has noted mistakes in the maps or recorded areas and has explained to the patwaris and circle officers the use of the maps. The registers opened by the patwaris were generally found defective, in that in Register No. I entries appearing in Registers Nos. II, III and IV were not shown, and the registers had therefore to be returned for correction."

C.—Maintenance of Boundary Marks.

41. A special report was submitted by me to the Board on this subject in my letter No. 2004 S., dated 20th November, 1899. With that report the rules framed by Mr. Stevenson-Moore for the main tenance of boundary marks and the opinions of the Commissioners of the Patna, the Orissa and the Chittagong Divisions were submitted, and the Board's instructions were solicited on the following points among others:—

(*a*) Whether the provisions of sections 19 and 52 to 56 of the Bengal Survey Act, V (B.C.) of 1875, can be applied to boundary marks erected under rule 5, Chapter VI of the Tenancy Act rules, or in the course of surveys carried out under the Survey Act, when the notices prescribed in section 15 of that Act have not been duly served.

(*b*) Whether recoveries can be made in advance under section 114 (*1*) of the Bengal Tenancy Act for the cost of the future maintenance of marks erected in the course of settlement operations.

The Board consulted the Legal Remembrancer, who replied as follows:—

(*a*) "When a Revenue officer in the course of his proceedings under Chapter X of the Bengal Tenancy Act makes a survey and puts up boundary marks, he makes the survey and puts up the boundary marks only because he is clothed by the Local Government under section 189 of the Bengal Tenancy Act with the powers of a Collector under Act V (B.C.) of 1875. The procedure is the same, viz., that provided for in Act V (B.C.) of 1875, whether the Collector puts up the boundary marks under the said Act, or whether the Revenue officer does it under Chapter X of the Bengal Tenancy Act. The issue of a notice

contemplated in the proviso to section 15, Act V (B.C.) of 1875, is not a condition precedent to the validity of putting up boundary marks. The only object of such a notice appears to be to inform the owners concerned of the specifications of the marks intended to be erected. The proviso is, in contemplation of law, merely directory and not mandatory."

(*b*) "We are materially concerned with the cases contemplated by sections 101 (*2*) (*a*) and 103, Bengal Tenancy Act, and Government before undertaking to prepare a record of rights can demand the payment of all expenses in advance. Section 114 (*1*) evidently provides for an apportionment of the costs after they have been actually incurred, the object being to recover a share of the expenses for the benefit of the applicants who had deposited the whole in advance."

The Legal Remembrancer's ruling does not, in my opinion, cover the whole ground to be dealt with, or altogether remove the difficulties which surround the question, and I propose to ask for instructions on some important points in connection with it when I submit the further report on the whole question which is now awaiting the receipt of certain information from the local officers.

42. The other points on which suggestions were offered by me and on which my proposals have met with the approval of the Board and of Government, are the following:—

(i) That trijunction marks only need be maintained, save where a boundary has been in dispute, and the line finally decided is indicated by permanent boundary marks, in which case these marks should also be maintained.

(ii) That the work of inspecting the marks and reporting on them should be entrusted to the village chaukidars.

(iii) That in districts which have been completely surveyed, the trijunction marks should be serially numbered for each thana and shown in an index register to be prepared for each thana and in the thana map.

Mr. Stevenson-Moore's rules will be revised in accordance with the above orders and resubmitted at an early date.

43. I submit below a *résumé* of the information furnished by the local officers as to the action taken during the year under report for the maintenance of permanent boundary marks under Part II, Chapter IV of the Survey and Settlement Manual, 1895.

Burdwan Division.

44. *Hughli.*—A statement has been prepared showing the position of the permanent boundary marks and their present condition. Missing marks are being replaced either by iron pillars or by earthen cones manufactured at Raniganj. The Collector expects that all missing marks will be replaced during the current year.

Burdwan.—The Collector has reported that no special inspection of boundary marks was made during the year. A report has been asked for from the Manager of the Burdwan Raj regarding the boundary marks in Raj villages, but it has not yet been submitted.

Midnapur.—An inspection of boundary marks was made by the tahsildars of Government estates, the Managers of wards' estates, police officers and chaukidars. The existing marks were found to be mostly in good order. There were many instances in which no marks were found, or such as were found had fallen into disrepair. The Collector has submitted a list of the marks included in the latter category, but has not reported what action he proposes to take to erect new marks or to replace lost and worn-out ones.

Birbhum.—Regarding the marks in the Hukumapur estates belonging to the Burdwan Raj, it is stated that they were inspected and found in good order.

Bankura.—Maps are being prepared and local enquiries made with a view to ascertain what boundary marks were erected in connection with cadastral surveys and other surveys which demarcate the boundaries of estates or tenures. When this work has been completed, action will be taken to maintain the existing boundary marks and to erect such others as may be necessary.

PRESIDENCY DIVISION.

45 *24-Parganas.*—The iron pillars demarcating the boundaries of the Panchannagram Government estates have been found in good order. In the Government estates in the Basirhat subdivision two marks have been recently removed, and they are being replaced by fresh ones. In the Government estates in the Barasat subdivision all the marks were found in existence and in good order. The estates in the Diamond Harbour subdivision have no permanent boundary marks.

Murshidabad.—The permanent boundary marks have been inspected, and no change is reported in their condition.

Nadia.—In the Sadar subdivision the pillars were inspected in char Kharia and mauza Harisankerpur and found in good order. In Chuadanga an inspection was made through the agency of the police, but the result is not reported. In Meherpur the marks were found in good condition. No inspection appears to have been made in the Kushtia and Ranaghat subdivisions, and the attention of the Subdivisional Officers has been called to the subject by the Collector.

Jessore.—There are no boundary marks in the Sadar, Narail, Jhenida and Magura subdivisions. In Bongong the pillars in the Ghazipur khas mahal, of which 13 were reported last year to be missing and 7 out of repair, are now reported to be in good order. Proposals have been submitted, and provision made in the Collector's estimates, for the erection of permanent boundary marks in two of the Government estates in the Magura subdivision, and three more estates are to be similarly dealt with later on.

Khulna.—There are no permanent boundary marks in the Satkhira and Bagerhat subdivisions. A few old survey pillars are said to exist in the Sadar subdivision, but they were not inspected in the course of the year. New pillars will be erected when necessary in the estates recently surveyed and settled.

RAJSHAHI DIVISION.

46. *Rajshahi.*—An inspection was made through the agency of the police village chaukidars and *panchayets*, and some twelve pillars were found to be out of repair. Steps are being taken to replace or repair all damaged pillars.

Jalpaiguri.—The Deputy Commissioner has submitted a full report, from which it appears that a large proportion of the very numerous boundary marks in this district were inspected. A good many near the banks of rivers have been washed away, and others have been tampered with or could not be found. Action is to be taken to replace or repair missing and damaged pillars, and to secure the careful preservation of such pillars by the jotedars in future.

Rangpur.—There are no permanent boundary marks in this district.

Dinajpur.—There was no case of injury to boundary marks in Government estates reported during the year. In the Maldwar ward's estate six pillars have been removed, of which two have been already replaced, and the remaining ones will be replaced during the current year. In the Churamon estate the marks were found in good condition.

Pabna.—There are no permanent boundary marks in this district.

Bogra.—In the Jaipur Government estates the marks were inspected in several villages by the Manager and the village *mandals*, with the result that three pillars were found to have been washed away and a good many to have been partially broken, while nine were missing. Steps will shortly be taken to replace the lost ones and to repair those which are broken. Trijunction marks will be erected in five villages in which they were not erected by the Survey Department.

Darjeeling.—In the hill Government estates the marks were inspected and found in good condition. In the Terai Government estates marks were not inspected pending orders on certain rules which have been submitted by the Deputy Commissioner to the Commissioner.

DACCA DIVISION.

47. *Dacca.*—It is reported that the permanent marks erected in connection with the cadastral survey of the Talipabad estate are the only marks to be inspected, but that none of these were inspected during the year.

Backerganj.—Inspection was made in the Government and ward's estates as usual by the Managers and tahsildars, and action was taken to restore marks lost and to repair those found damaged.

Mymensingh.—The tahsildar and the kanungo inspected the marks in the Government estates, all of which possess boundary marks, but no case of injury to, or removal of, any was reported.

Faridpur.—The tahsildars inspected the marks in the estates under direct management, and it was not reported that any of them were missing.

Chittagong Division.

48. *Chittagong.*—Inspection was made, as far as practicable, and the marks were found in their places and in good condition, except one, which was found to have been removed.

Tippera.—Two pillars in the Sadar subdivision and two in the Chandpur subdivision were found damaged, and one pillar in the latter subdivision was found to have been washed away. It has not, however, been reported what steps have been taken to repair or replace them.

Noakhali.—There are 264 pillars on the boundaries of Government estates and a large number in the permanently-settled estates. Out of 264 pillars in the former estates, 221 were inspected and found in good order. A complete list of the boundary pillars is being prepared, and the sub-tahsildars and the police have been instructed to keep watch over them.

Patna Division.

49. *Patna.*—No inspection was made.

Gaya.—In the Government estates stone-pillars, and in the Tikari ward's estate, earthenware cylinders mark the trijunction points. The marks both in the Government estates and the Tikari ward's estates were inspected, and a few pillars were found to have been removed. In one case proceedings were taken against the neighbouring landlords under section 52 of Act V (B.C.) of 1875, who were fined. The fines were subsequently remitted, and the landlords discharged with a warning.

Shahabad.—Some progress was made in the erection of permanent boundary marks in Government estates. The Collector reports that although the special attention of subordinate officers had been called to the necessity of inspecting such marks, not much was done, and he proposes to ensure a better observance of the rules on this subject in the current year.

Saran.—In the Government estates the marks were inspected by the kanungoes and found in good order. In the Hathwa estate the inspection was made by the patwaris, who have been furnished with copies of the village maps, and by other Raj officials, with the result that in 31 villages the marks were found to have been damaged or removed. Steps are being taken to restore or repair them.

Muzaffarpur.—In the Government estates in the Hajipur subdivision, with the exception of two marks washed away by floods, all the boundary marks were found existing in good order. Elsewhere with the exception of some stone prisms carried off by floods and of two otherwise removed, the marks are in existence. Steps will be taken to replace the lost ones as soon as possible.

Darbhanga.—In the Sadar subdivision the marks were inspected in 49 villages and found in good condition, excepting one in village Imadputti, removed by the *malik* of a neighbouring village against whom action is being taken. The 31 pillars erected in the Bukhtiarpur Government estate in the Samastipur subdivision were found in good repair. In the Pusa Government estate five masonry pillars were repaired, and a few iron ones were newly erected. Such boundary marks in the Madhubani subdivision, as were inspected by the Subdivisional Officer, were found in good condition.

Champaran.—The Collector has been trying to collect information from landlords on the subject, but has not been successful as yet. He has not informed me whether any independent enquiries have been made as to the condition of boundary marks by subordinate officials in his district. The Manager of the Bettiah Raj ward's estate is making enquiries on the subject in the villages pertaining to that estate.

Bhagalpur Division.

50. *Bhagalpur.*—Most of the boundary marks in the Tintanga khas mahal were inspected, but it has not been reported in what condition they were found.

Monghyr.—The only boundary marks in the Government estates are those on the boundary line between the Binda Diara Government estate and the private estate of taufir Basdeopur, and no damage or injury to any of these has been reported. The marks in the Narhan ward's estate and the Raj Baneli estate in pargana Farkiya were inspected by the police, and some were found to have been washed away by floods. Steps should be taken, if possible, to have them re-erected.

Purnea.—There are no permanent cadastral survey boundary marks. The few boundary marks that exist in Government estates were inspected. As disputes arise as to the boundaries of these estates at every resettlement, the Collector proposes to erect further marks at an early date.

Malda.—The boundary pillars in the Government estates of Sherghar-Panchanandpur and Jhaubona-Kaukribadha were inspected and found in a state of good repair with the exception of one washed away by floods.

The Sonthal Parganas.—It appears that the matter of the inspection of boundary marks escaped attention in this district during the past year. The Deputy Commissioner has issued orders to secure that this important matter shall not be neglected in future years.

Orissa Division.

51. *Balasore.*—Village officials were directed to inspect and report on the boundary marks, but no report of loss or injury was received.

Cuttack.—It is reported that no inspection of boundary marks could be made during the year for want of a list of such marks and a map showing their position. While it is difficult for the Collector to cause any complete inspection to be made until all these marks have been numbered and rules have been framed for their periodical inspection, something might have been done, as has been done in other districts, to ascertain the general condition of these marks.

Puri.—In the Sadar subdivision 23 pillars were found broken and 7 removed. Of the former 13 have already been repaired, and the remaining 10 will be repaired shortly. The cost of repairing is being realized from the persons who are bound under the law to maintain them. It is said that the marks removed will be replaced on receipt of maps showing the exact position in which they should be erected. The Collector should consult the copies of the village maps already supplied to him by the Settlement Department, and should utilize them in re-erecting the lost marks. In the Khurda subdivision some marks were found removed or broken. Steps are being taken to repair or replace them at the cost of the parties responsible for their maintenance.

Angul.—The *sarbarahkars* and the village chaukidars inspected and reported on 1,923 masonry and other pillars, of which 309 were found entirely broken or removed, and 520 partially damaged. An estimate of the cost of replacing or repairing them has been submitted, and the work will be taken up shortly.

Chota Nagpur Division.

52. *Ranchi.*—The tahsildar inspected the marks in 16 villages belonging to Government, and found some pillars broken. These will be repaired during the current year.

Hazaribagh.—The 64 boundary marks in the Hata estate and the 84 boundary marks in the Kharakdiha estate were inspected by the tahsildars and found in good repair. In the Dhanwar ward's estate the Manager inspected the marks and found them in good condition.

Manbhum.—The Deputy Commissioner reports that the trijunction pillars in estates Mahta and Kailapal were not inspected during the year, but that they are supposed to be in good order. A similar report was submitted last year. It has not been stated why they were not inspected.

Palamau.—Ten permanent boundary marks were inspected as in the previous year. The result of this inspection has not been reported. Special reports were submitted on the subject of the clearing of the boundary line and of

maintaining it and the marks along it. Government orders have been received, and a sum of Rs. 16,000 has been granted for work in connection with the maintenance of the records and the erection of boundary marks. The Deputy Commissioner has been making arrangements to carry out the orders.

Singhbhum.—The trijunction points in the Kolhan estate are marked by heaps of stones which are looked after by the village officials. Eighty-eight pillars were erected on the boundary line between Mohurbhanj and this district. These pillars, as well as those erected on this boundary line in previous years and on the boundaries between the Kolhan and Mohurbhanj, and the Kolhan and Keonjhur, were found in good order.

CHAPTER III.

UTILISATION OF LAND RECORDS.

53. Further action has been taken during the year under report to extend the usefulness of the land records prepared in districts which have been wholly surveyed cadastrally.

An important note by Mr. L. Hare, I.C.S., C.I.E., Commissioner of the Patna Division, in which he has pointed out the value of these records to District Officers in almost every branch of their work, has, with the approval of the Board, been printed and circulated to all Commissioners, Collectors and Deputy Commissioners.

A letter has been issued to the Commissioners of the Patna, Orissa and Chittagong Divisions calling attention to the action recently taken by the Magistrate of Muzaffarpur with a view to the utilisation of the work of the Settlement Department in the trial of riot and other similar criminal cases having reference to land disputes. The following is the text of the order in question, issued by the Magistrate of Muzaffarpur in 1895, a copy of which has been kindly sent me by Mr. Hare:—

"I wish to remind Magistrates who have to try cases in which disputes occur as to the possession of land of the importance of taking advantage of the records of the Settlement Department, so far as it is possible to do so. . . . . It very frequently happens that a party, having been worsted in a dispute before the Settlement Officer, tries to establish his possession by force. In such cases it is clearly undesirable that the Magistrate should re-open a question which has already been decided by a competent court. It should always be enquired whether the Settlement Department have not already decided the question. Care must be taken not to give decisions which conflict with the decisions of the Settlement Officers, who are competent and proper officers for the decision of such cases. . . . . It is the business of the Magistrates to support the Civil Courts and the Settlement Courts, and to take care that matters already once decided are not permitted to be re-opened in the Criminal Courts. I shall be glad if all Magistrates will take advantage of every opportunity of studying the settlement records, so as to know where to put their hands readily on such information as is recorded, and so as to know exactly what is the nature of the facts that have been recorded by that Department."

Important action has been taken by Government to ensure that full use shall be made of our maps and records in connection with the approaching census operations. By thus adopting an accurate geographical basis for these operations, circles can be correctly marked out, lists of villages prepared without fear of duplication or confusion, and it can be certified that every acre of a district has been dealt with by the census enumerators, and that no area within it has been dealt with twice.

54. His Honour the Lieutenant-Governor has been pleased to notify, under section 2 of the Indian Registration (Amendment) Act of 1899, that all lands and houses, not being houses in towns, must be described for the purposes of section 21 of the Indian Registration Act, 1877, in the districts of Muzaffarpur, Champaran, Saran, Cuttack, Balasore, Puri and Chittagong, by reference to the detailed maps prepared in the course of the recent surveys of those districts. With reference to other districts which have only partially been dealt with by the Survey Department, attention has been drawn by Government to Circular No. 48, dated 30th December, 1894, issued by the Inspector-General of Registration, and the officers of the Registration Department have been asked to carry out the instructions contained therein as to the insertion of the survey

numbers of lands, where practicable, in all documents relating to immoveable property which are presented for registration.

55. Sanction has also been received from Government to the preparation of a special thana map, based on the results of the recent survey operations, for every thana in the districts that have been cadastrally surveyed, together with a list of the villages in that thana numbered so as to form an index to the map. These maps and index lists are now being printed, and will be issued for the use of district and other local officers as soon as they can be completed.

56. I have reason to believe that the statistical thana registers prepared in the course of our recent operations in Orissa and North Bihar, the completion reports of the settlement of parganas and estates in Orissa, and the records of rights prepared for districts and isolated estates in all parts of Bengal within the last ten years, are being made use of by all local authorities more extensively every year, and that the detailed and accurate information given in them as to the circumstances of every village with which they deal is now much more fully appreciated than it was but a very short time back.

CHAPTER IV.

SCIENTIFIC AND NATIONAL ENQUIRY UNDER IMPERIAL CONTROL.

Botanical examination of various leguminous crops.

57. The botanical examination of various leguminous crops, which was taken up by Major D. Prain, I.M.S., Superintendent of the Royal Botanic Gardens, during the year 1897-98, was completed during the year 1898-99, but the Superintendent has not had time as yet to submit his report of the results obtained. The pressure of urgent work has also prevented this officer's taking up any fresh crop for examination, but a valuable addition has recently been made by him to our knowledge of oil-seeds by the preparation of a translation of a German paper by Professor Kinzel on the chemical analysis of oil-seeds. This translation is now in the press, and will shortly appear as an Agricultural Bulletin.

Sola (Æschynomene Indica).

58. The collection of materials for the examination of these plants has been completed, and the specimens, which have been collected from all parts of Bengal, are now being dealt with by Dr. Watt.

Betel-leaf (Piper betel, pán).

59. The enquiries on the subject of this crop have been continued during the past year, and complete papers showing the results of those enquiries have been forwarded to the Reporter on Economic Products to the Government of India. Dr. Watt has recently informed me that he proposes to issue the information thus collected at an early date as an Agricultural Ledger.

Betel-nut Plague in East Bengal.

60. Dr. Watt's report on this important subject is now under issue. There has been no revival of the plague in Bengal during the past year.

Sugarcane Disease (Trichosphœria Sacchari).

61. Owing to the inconclusive results which were attained last year from the investigation into sugarcane diseases in Bengal, these enquiries have been renewed, and are being conducted under Major Prain's instructions. There appears to be little doubt that *trichosphœria sacchari* is prevalent in some of its stages in Bengal, but it seems uncertain how far the disease has developed, or is likely to develop in the climatic conditions of these Provinces. The District and other officers who have been consulted on the subject have shown much interest in the investigation, and some valuable notes on the subject have been submitted by them with the canes which have been sent for examination. A further report on the subject will be submitted to Government in the course of the current year.

Enquiry regarding the effects of the increasing imports of refined sugar on the cultivation of sugarcane and the profits of the Indian Sugar Industry.

62. Act XIV of 1899, imposing a countervailing duty upon bounty-fed sugars imported from abroad, was brought into force in the course of the past year, and in December, 1899 the Government of India enquired whether the Act had produced any effect upon the sugar-refining industry of Bengal, which had previously suffered from the competition with imported sugars. Enquiries were made with the result that almost all the officers consulted reported that it was too early as yet to gauge the effects of the working of the Act. I have now caused fresh enquiries to be initiated through the medium of District and other officers, and have asked whether any marked fluctuations have been observed of late in the prices of, and demand for, cane, *gur*, and common sugars, how far such fluctuations have been due to the imposition of a countervailing duty on bounty-fed sugars from abroad, and whether they have led to any revival in the trade of sugar-refining in Bengal. A further report on this subject will be submitted to Government in the course of the year.

Jute.

63. Further action has been taken during the year towards the collection of specimens of the various kinds of jute grown in Bengal, and a large number of such specimens, collected by Babu Nibaran Chandra Chaudhuri, Travelling Overseer of the Department, have been forwarded to the Reporter on Economic Products, together with a full descriptive note concerning them. Under instructions received from the Reporter, it is proposed to extend the enquiries on this subject and the collection of specimens in the current year.

Further investigation into the cause of the discoloration of jute in the district of Backerganj tends to confirm the suggestion made by Dr. Watt that it is due to the presence of iron in the water employed for steeping the jute, and the only remedy would appear to be to get rid of this iron. If the iron appears in a soluble form, it has been suggested that it might be precipitated by lime or alkaline earth, but if it is insoluble and mixed with mud, it will be necessary to filter the water. Experiments will be made during the present jute season to ascertain whether any improvement in the colour of this jute can be attained by either of these methods.

Dioscorea (yams).

64. In August, 1899 I received a letter from the Reporter on the subject of the forms of yam (*dioscorea*) met with in India. He pointed out that very little was known about this important crop, and that its botany was in a state of confusion, and suggested that samples of all yams found in Bengal, whether wild, cultivated, indigenous or exotic, should be obtained. I have accordingly circulated copies of Dr. Watt's letter to all District Officers and have invited their co-operation in the collection of specimens with the requisite descriptive notes. A ready response has been met with, and a large number of live tubers as well as botanical specimens have already been forwarded to the Reporter.

Chemical analyses of soils by Dr. J. Walter Leather, Assistant Agricultural Chemist to the Government of India.

65. The analysis of soils initiated by Dr. Leather in 1898-99 has been continued throughout the past year, and several reports of importance have been received from him on the subject. My Assistant Directors have been unable as yet, from pressure of other work, to deal with the results that have been obtained, but I hope that some progress may be made towards the utilisation of this information in the course of the current year.

Chemical analysis of Indian food-grains and fodder by Dr. J. Walter Leather, Assistant Agricultural Chemist to the Government of India.

66. On the invitation of Dr. J. Walter Leather, Assistant Agricultural Chemist to the Government of India, a collection of grains is being made for

chemical analysis by that officer. The crops selected for analysis in the first instance are rice, wheat and mustard : rice as being the most important cereal in Bengal, wheat and mustard in order that the results of this analysis may be added to the information contained in recent bulletins on the subject of these crops. Major Prain has kindly advised us as to the best specimens of each crop to be obtained for analysis, and has identified the specimens sent before their despatch to Dr. Leather. The results of these important analyses will be published as soon as they have been completed.

Saline efflorescence or Reh in North Bihar.

67. I regret to report that it has not been found possible to take any practical steps as yet to make use of the information contained in the reports of certain analyses made by Dr. Leather of alkaline soils received during the year. The subject is one of much difficulty, and it is by no means certain at present that we shall find it possible to take any effective action to improve the areas affected by *Reh* in Bihar, owing to the density of the population, the closeness of the cultivation, and the conservatism of the agriculturists. I hope, however, to be able to compile the results of the investigations made in a convenient form in the course of the year, when it may prove possible to initiate some practical experiments which will help us to determine how to deal with the question.

Enquiry regarding the supposed injurious effects of well irrigation in certain tracts in North Bihar.

68. In paragraph 76 of the Annual Report submitted by me last year I pointed out that the enquiries on this subject had narrowed down to an investigation of the question whether certain lands when once irrigated required constant irrigation afterwards, although they had previously borne crops without irrigation. Mr. D. J. Macpherson, I.C.S., C.I.E., had suggested that some change was effected by irrigation in the mechanical texture of the soil, which produced the result referred to, and I proposed in that report to institute some practical experiments in the field and the laboratory to ascertain whether this was the case. I regret to say that no progress has been made with this matter. The result of Dr. Leather's analyses of certain specimens of soil and water forwarded to him has been of a negative character, nothing being discovered to show that the water would prove injurious to any crop, or that the soil would suffer in any way from irrigation. At the same time it has been pointed out by Dr. Leather that the proposed experiments would have to be conducted with the utmost care, and would require detailed and expert supervision. In the present circumstances of the Department I have neither the money nor the establishment to carry out such experiments; and although I will try to collect further evidence as to the exact nature of the injury which irrigation is supposed to inflict in these particular lands, I am not sanguine of attaining any very practical success.

Collection of articles for the Indian Museum and the Imperial Institute, London.

69. During the year under report 20 specimens of economic products were collected by this Department through its Travelling Overseers for the Imperial Institute, London, and were forwarded to the Reporter on Economic Products to the Government of India. Several specimens of lac-toys collected from different districts of Bengal were also sent to the Reporter. The cost of making these collections amounted to Rs. 270-5-6. A list of the products of which specimens were collected and sent is appended to this report.

Bengal Veterinary Department—Cattle-breeding.

70. Veterinary Major Raymond, Superintendent of the Civil Veterinary Department, Bengal, has reported fully on the working of that Department, and his report has been separately submitted to Government. But little progress has been made in the attempt to improve the breed of cattle in Bengal.

Many of the bulls previously imported have been used with valuable results, but several of those brought in during the year from Hissar have proved failures, although special arrangements were made to secure their careful selection. Government sanction has not yet been received to the opening of the proposed cattle farms at Pusa in Darbhanga and Hathwa in Saran, and until we can take some action to breed suitable bulls within the Province itself, I fear that we cannot hope for much advance.

CHAPTER V.

SCIENTIFIC AND LOCAL ENQUIRY UNDER PROVINCIAL DIRECTION.

Analyses of districts.

71. It has not been found possible to take any action to commence the analysis of the agricultural circumstances of any fresh district, and for the reasons which I gave in my last Annual Report, I see no early prospect of being able to take this question up.

Experimental Farms.

72. The following are brief accounts of the work done at the experimental farms maintained in Bengal under the supervision of this Department. The detailed results of the experiments carried out during the year will be found in the annual reports of those farms, which are published separately. During the year under report Mr. N. N. Banerjei, Assistant Director, was in charge of the Dumraon Farm, while Mr. D. L. Roy superintended the working of the one at Burdwan. The small farm which is kept up at Sibpur in connection with the agricultural classes there, was in the charge of Mr. N. G. Mukherji, the Agricultural Lecturer, throughout the year, and he has favoured me with a brief report of its working which is summarised below. Farms have also been started at Chittagong, Gaya and Sripur (Hathwa), and reference has been made to them below in the paragraphs dealing with agricultural experiments.

The operations carried out during the year under report on the Burdwan and Dumraon Farms were similar to those of previous years, and comprised—

(I) Experiments with manures;
(II) Trials with improved implements;
(III) Experiments in methods of cultivation, and
(IV) Experiments with new crops and new varieties of existing crops.

Burdwan Farm.

73. *I.—Experiments with manures.*—The experiments under this head were undertaken with a view to test the effects of different manures on winter paddy, jute, sugarcane and potatoes.

(1) *Paddy.*—Three sets of manure experiments were made with this crop.

(*a*) The first was intended to ascertain the relative merits of cowdung, castor-cake, bonemeal and bonemeal and saltpetre. The last-named manure gave, as in previous years, the highest outturn, viz., 3,493lbs. of grain per acre, followed by cowdung, which yielded an outturn of 3,193lbs. per acre. The average of the unmanured plots amounted to 1,613 lbs. per acre only. The cowdung plot, however, yielded slightly better financial results, owing to the comparatively higher price of bonemeal and saltpetre. The actual profits obtained by the sale of the produce in the above three cases was as follows:—

	Profit. Rs.	
Produce from bonemeal and saltpetre ...	38	per acre.
„ „ cowdung ...	40	„ „
„ „ no manure ...	11	„ „

Castor-cake proved inferior to bonemeal both in respect of outturn and profit. Bonemeal itself was below cowdung in respect of outturn.

(*b*) The second set of experiments was made with a view to check the results obtained in the first series. The amounts of manure applied in the first series not having a very definite relation to one another, the manures in the second series were all applied in amounts equivalent to 50 lbs. of nitrogen per acre. The results in this series also pointed to the superior manurial value of a mixture of bonemeal and saltpetre for paddy. In all the three plots in which this mixture was used, the outturn was higher than in the contrasted cowdung plot, and in one of the three plots better financial results were also obtained than from the application of cowdung. Bonemeal alone also gave very good results, but saltpetre alone proved very inferior.

(*c*) The third experiment in the paddy series was designed to ascertain the relative merits of cowdung and green manuring. The crop used for green manuring was jute. As in the previous three years, so in the year under report, jute when ploughed in proved to be a better and a more profitable manure than cowdung applied at the rate of 50 maunds per acre. The outturn of grain obtained from the green manure plot amounted to 2,322 lbs. per acre, against 2,167 lbs. obtained from the cowdung plot, and 1,446 lbs. only obtained from the unmanured plots.

(2) *Jute.*—The manure experiment with jute failed owing to continuous rainfall immediately after sowing.

(3) *Sugarcane.*—The experiment with this crop was intended to ascertain the relative merits of bonemeal, cowdung, a mixture of cowdung and bonemeal, and a mixture of cowdung and super phosphate of lime, so applied in each case as to give to each plot nitrogen at the rate of 250 lbs. per acre. The results obtained from this experiment for the last five years have been very conflicting. Bonemeal by itself gave the highest outturn during the year under report. Red-ants did considerable damage to the crop, and the financial results were consequently very unsatisfactory. The experiment must be continued for some years before any conclusions can be drawn.

(4) *Potatoes.*—Manure experiments were made with potatoes—

(*a*) to compare the effects of the application of cowdung, castor-cake, bonemeal, *neem*-cake and *mahua*-cake. Castor-cake yielded the highest outturn (22,632lbs. per acre), and then came bonemeal with an outturn of 20,844 lbs. per acre. The latter manure, however, yielded the largest profits. *Neem*-cake and *mahua*-cake, which were used for the first time, proved very inferior manures.

(*b*) To contrast the manurial value of cowdung as pitted on the farm with that of cowdung purchased from the raiyats. As in the three previous years, the results were in favour of the dung conserved on the farm. This cowdung was as usual carefully preserved in *pucka* pits protected from rain and sun by thatched roofs.

II.—Trials with implements.—The improved implements tried on the farm during this year were the Sibpur plough, the American hoe, and the Behea sugarcane mill and pan.

(1) *Sibpur plough.*—The Sibpur plough was contrasted with the country plough on paddy land, and proved to be the more effective implement. The average outturn of the three plots on which the Sibpur plough was worked amounted to 2,261 lbs. per acre, against 1,944 lbs. per acre, the average outturn obtained from the plots ploughed with the country plough.

(2) The American hand-hoe and the Behea mill and pan continued to give satisfaction.

III.—Experiments in methods of cultivation.—Experiments under this head were made with paddy, sugarcane and potatoes—

(*a*) The experiments with paddy were designed—

(1) To compare the effects of thick and thin sowing.
(2) To compare the outturn raised from selected seed with that obtained from the use of seed not specially selected.

(1) *Thick sowing* vs. *thin sowing.*—By sowing at the rate of 30 seers per acre, a slightly higher outturn was obtained, as in previous years, than by sowing at the ordinary rate of the farm of 15 seers per acre.

(2) *Selected seed* vs. *seed not specially selected.*—The outturn from selected seed was nominally higher than that obtained from seed not selected, but the quality of the grain was decidedly superior in the former case.

(*b*) *Sugarcane.*—Experiments with sugarcane were made with the object of—

(*i*) Contrasting the method of trench-planting with the ordinary method of planting in shallow furrows.
(*ii*) Testing the effect of *ratooning khari* sugarcane, as compared with that of planting it annually.
(*iii*) Comparing the value of the system of planting tops with that of planting cuttings obtained from the entire cane.
(*iv*) Testing the effects of binding *khari* sugarcane, a process not generally adopted for this variety of cane.

The first of the above experiments failed through the fields upon which it was tried becoming water-logged.

Ratooned canes gave a higher outturn of *gur* and a higher profit than fresh planted canes.

The outturn obtained from entire cane cuttings was higher, as in the previous year, than that obtained from tops, but as the experiment has only been made for two years, and on a very small scale, no definite opinion can yet be passed on the comparative merits of the two systems of planting.

Wrapping *khari* canes with their leaves was found successful. The experiment is to be continued.

(*c*) *Potatoes—Cut sets* vs. *whole tubers.*—The experiment under this head showed that for the same weight of seed cut sets gave a better outturn, but for the same number, whole tubers gave a heavier yield. For all the three years during which the experiment has been made, the financial results have been in favour of cut sets.

IV.—Experiments with new crops and with new varieties of existing crops.—The crops experimented with under this head were paddy, sugarcane, potatoes, maize and *sorghum.*

(*a*) *Paddy.*—Of seven varieties of fine and coarse paddy contrasted, a local fine variety known as *Bansmati* paddy yielded the highest outturn and the highest profit as in previous years, while next to it in both these respects came another local variety known as *paramannasal* paddy, a variety valued as being very wholesome for consumption. Imported varieties gave the worst results.

(*b*) *Sugarcane.*—Four varieties were tried, viz., the *Samsara*, Poona, *Kajli*, and Puri, the Poona variety being the only imported variety. The *samsara* was the most productive (yielding 5,928 lbs. of *gur* per acre) and the Puri was the poorest yielder (with an outturn of 4,120 lbs.). The *Kajli* variety gave better results (5,883 lbs.) than the Poona (4,411 lbs. per acre).

(*c*) *Potatoes.*—The seed tubers used in the experiment were of the Naini Tal, *Amragachi*, and country varieties. In the case of the *Amragachi* variety, seed preserved on the farm from the previous year's crop was sown on one plot, and freshly imported seed in a second

plot. This last yielded the highest outturn, viz., 17,376 lbs. of potatoes per acre. Next came the Naini Tal variety with an outturn of 16,962 lbs. per acre. The *Amragachi* seed potatoes preserved on the farm gave an outturn of 12,756 lbs. per acre, and the outturn of country potatoes amounted only to 7,368 lbs. per acre.

(*d*) *Maize.*—American and Jaunpur maize were grown, but gave very unsatisfactory results.

(*e*) *Sorghum.*—The black-seeded *sorghum* proved, as in the previous two years, to be a more productive variety than the red-seeded *sorghum*.

Receipts and expenditure.—The total receipts during the year under report, including valuation of stock in hand, amounted to Rs. 1,106, against Rs. 1,182, the receipts for 1898-99, and the total expenditure for 1899-1900 was Rs. 2,298, against Rs. 2,359, the expenditure of the previous year. The Rs. 2,298 includes an expenditure of Rs. 190 incurred in breaking up new land which is to be put under cultivation during the current year.

Selected seed was distributed as usual to the neighbouring cultivators.

Dumraon Farm.

74. *I.—Experiment with manures.*—The experiments under this head were conducted with the view of ascertaining the relative merits of different manures for paddy and wheat:—

(*a*) In the paddy experiment the manures used were cowdung, bonemeal, castor-cake, ashes of cowdung, ashes of cowdung and saltpetre, cowdung and castor-cake, and bonemeal and saltpetre. The highest outturn of grain (1,900 lbs. per acre) was obtained, as in the preceding year, from the castor-cake plot. Bonemeal proved to be the most inferior manure as before, giving only a slight increase over the unmanured plot, which yielded an outturn of 1,000 lbs. of grain per acre. The rest of the manures gave about equal results, the outturn obtained by their application varying from 1,650 to 1,750 lbs. of grain per acre.

(*b*) The manures used for irrigated wheat were cowdung, ashes of cowdung, ashes of cowdung and saltpetre, bonemeal, night-soil, town sweepings and green manures. Ashes of cowdung and saltpetre and town sweepings gave the best and about equal results as in previous years, but the outturn from cowdung fell off a little. The other manures proved more or less ineffective. Green manuring as in previous years gave very poor results.

(*c*) Cowdung as usual did no good to unirrigated wheat.

II.—Trials with improved agricultural appliances.—The only implement tested under this head was the Sibpur soil-inverting plough, which was used both on paddy and wheat lands. The results obtained during the year add further support to the opinion already expressed in the Annual Report for 1898-99, that on high lands where the soil can be inverted and thoroughly exposed to the effects of sun and rain, as was done with the wheat plots, the Sibpur plough is found useful, but that it cannot be worked effectively on low wet paddy lands.

III.—Experiments in methods of cultivation.—Potatoes (Naini-tal). The experiment to contrast the method of planting whole tubers with that of planting cut sets, the same number being planted in each case, resulted in a higher outturn being produced from the use of whole tubers, but as in the Burdwan farm so here it was found more economical to use cut sets. This has been the experience on both the farms for the past five years, and the result of the experiment may be accepted as conclusive.

IV.—Experiments with varieties of crops.—The crops experimented with under this head were paddy, potatoes, wheat, sugarcane and maize:

(*a*) *Paddy.*—The varieties tried were Assam paddy, Diamond Harbour paddy, *bansmati* paddy (local), and *bataspheni* paddy (local). The local varieties gave better results than imported varieties. *Bansmati* paddy gave the highest and Assam the lowest outturn of grain.

(*b*) *Potatoes.*—Two local varieties, Ghazipur and Bettiah, were contrasted with the *Amragachi* (Patna) variety. The Ghazipur was the most productive, and next in point of productiveness came the *Amragachi* variety. This variety was tried for the first time during the year under report. The experiment is to be continued.

(*c*) *Wheat.*—Ten varieties were contrasted, viz., red and white Buxar (local), red and white Muzaffarnagar, red and white Punjab, red and white Cawnpur, and red and white Bombay. The four last took the place of the four varieties from the Central Provinces, which were excluded from the experiment in 1898-99, owing to their great liability to rust. Buxar white wheat and Muzaffarnagar white wheat maintained their reputation as the heaviest producers. Next to them came the Punjab white wheat. The Cawnpur and Bombay varieties did not give good results, but as they were tried for the first time during the year under report, nothing definitely can be said yet of their productive capacity or of their suitability to the soil and climate of the Dumraon farm.

(*d*) *Sugarcane.*—*Samsara*, *Khari*, red Bombay and Poona sugarcane were grown on a small scale for cuttings only. These were planted out on the farm last cold weather.

(*e*) *Maize.*—This experiment was a failure, as heavy and continuous rain immediately after sowing damaged the crop very badly.

Distribution of seeds.—Different kinds of selected seeds and manures were distributed in large quantities to different places for experimental cultivation. The raiyats of Dumraon continued to extend their cultivation of *khari* sugarcane in place of their own local variety. Muzaffarnagar wheat was also largely grown by them. The cuttings and seeds of the above crops were originally supplied from the farm.

Conservation of manure.—Brick, cemented pits were constructed during the year, and cattle-dung and urine are now being pitted in them regularly.

Training of students and cultivators.—Four students from the Sibpur College received practical training on the farm last cold weather. A Muhammadan cultivator sent by the General Manager of Wards' Estates, Patna, was also trained by the Overseer.

Receipts and expenditure.—The total expenditure incurred in the maintenance of the farm and of the Economic Museum during the year amounted to Rs. 2,401, against Rs. 2,657, the expenditure incurred in the previous year. The receipts amounted to Rs. 736, against Rs. 941. The decreases in receipt was chiefly due to the great damage done to all the *rabi* crop by hails in January.

The Sibpur Farm.

75. This was the second year of the connection of this farm with the Agricultural Department of the Civil Engineering College. There were during the year 13 students in the higher class and 6 in the lower, against 11 and 2 students, respectively, in the previous year. The students shared in all kinds of work done in the farm, and the cropping of the farm was aimed chiefly at giving the students the opportunity of managing a large variety of crops and implements.

The crops grown during the year were:—(1) fourteen varieties of winter paddy, (2) one variety of autumn paddy, (3) wheat, (4) oats, (5) three varieties of maize, (6) *china* (*panicum mileaceum*), (7) *sorghum vulgare* and *saccharatum*, (8) *reana luxurians*, (9) *panicum muticum*, (10) Cabul gram, (11) *kalāi*, (12) *mung*, (13) peas, (14) *Cyamopsis psoroiloides*, (15) guinea grass, (16) *khesari*, (17) *arahar*, (18) linseed, (19) ground-nut, (20) jute, *deshi* and Sirajgunj, (21) *hibiscus cannabinus*, (22) *crotolaria juncea*, (23) Egyptian, Sea-island, Garo Hills and *deshi* cottons, (24) *sesbania aculeata*, (25) *agani sisorlana*, (26) *fourcroya gigantea*, (27) *boehmeria nivea*, (28) mulberry, (29) arrowroot, (30) *cassava*, (31) an African yam, (32) potatoes, (33) turmeric, (34) cauliflower, (35) cabbages, (36) *knol kohl*, (37) beet, (38) tomatoes, (39) *pophat* (*labiab vulgare* of the Central Provinces), and (40) four varieties of sugarcane.

The crops that attracted the special attention of the students and of other visitors to the Farm were:—(1) a fine variety of *aus* paddy, of which 6½ maunds were sold for seed; (2) some other varieties of paddy; (3) *cyamopsis psoroiloides*, which is a leguminous fodder-crop growing equally well in the *rabi* and *kharif* seasons; (4) *pophat*, the seeds of which were appreciated by the European residents of the college as being almost equal to *haricots;* (5) a fast-growing fodder-grass (*panicum muticum*) growing equally well in shallow water and on dry land; (6) the Cabul gram; (7) the *cassava;* (8) the African yam; (9) the *khari* sugarcane, and (10) guinea grass. Seeds, cuttings, or roots of most of these were bought by students and others for experimental cultivation.

The implements that were used for the first time during the year were the Hunter hoe and a light and handy steel-yard weighing up to 50 lbs. The former was found useful not only for hoeing proper, but also for hilling cabbages, sugarcane, maize, *reana* and potatoes. The other implements that were constantly used during the year and which continued to give good results were the Sibpur plough, the turn-wrist plough, the double mould-board plough, the South Indian *bakhar*, a five-tined grubber, a zig-zag harrow in two sections, the Planet Jr. wheel-hoe, a root-pulper, iron *dôus* and the Barrakar chain-pump.

The only implement available for sale was the Sibpur plough, of which 9 were sold during the year, against 17 in the preceding year.

The manure experiments worthy of notice are :—

(1) *The application of mahua-cake as a manure for paddy.*—This manure again, as in the preceding year, proved a better manure for paddy than rape-cake.

(2) *Castor-cake as a manure for cabbages.*—This gave during the year under report a better yield of cabbages than saltpetre, though in some previous years saltpetre had proved more beneficial.

(3) *Green manuring* was again tried for potatoes and proved highly beneficial. A crop of *dhaincha* (*seabania aculeata*), which grows 10 to 12 feet high in three months, was cut down when in flower, in August, and left to rot on the field. The sticks left were collected and sold and the land prepared in October for the potato crop. The whole cost of growing the preparatory crop of *dhaincha* was more than made up by the sale of *dhaincha* sticks, which are used as stakes in *pan* gardens. Some plots that had the *dhaincha* crop on it were given no other manure. Even these gave better crops than highly-manured plots that had had no such preparatory crop grown on them.

Two experiments in methods of cultivation may be noticed as having given confirmatory results: (1) potatoes sown cut gave, both absolutely and relatively, a larger yield than potatoes sown whole. (2) Potatoes sown in double lines gave absolutely a better result than potatoes sown in single lines; but the proportion between the seed used and the crop obtained was larger in the latter case.

Receipts and expenditure.

The receipts during the year came to Rs. 744-13 6, against Rs. 1,204-13, Rs. 1,100-9-9 and Rs. 1,005-7-9 during the previous three years. The expenditure came to Rs. 3,452-0-1, against Rs. 3,497-11-7, Rs. 3,159-3-9 and Rs. 3,917-11-4 during the previous three years.

The great falling off in the receipts was due to the comparative failure of several crops in the farm in the course of the year. The causes of this failure have been the subject of separate enquiry.

Agricultural experiments and the introduction of new and improved staples in Government, Wards' and Private Estates.

76. In the paragraphs below a brief account is given of the action taken by various officers during the year to give some direct encouragement to agriculture. The year has not been a very successful one in this respect, some of the chief projects of the Department having perforce remained in abeyance through want of funds, and the season having been not altogether favourable to *rabi* crops, which are those which have been chiefly experimented with. Some

progress has been made, however, and further knowledge has been acquired of the requirements of many districts. Although constant attention is paid to the subject, the Assistant Directors of the Department have unfortunately been unable to spare much time for the inspection of the work being done, and we have been short-handed, as far as Travelling Overseers are concerned, throughout the year. During the current year, however, we hope to obtain assistance from the agricultural students who are passing out of the classes at Sibpur, and to be able to inspect this branch of the operations of the Department more thoroughly. Babu Charu Krishna Mozumdar has continued his profitable and interesting agricultural work at Islampur in Murshidabad. Farms have been started in Gaya and Chittagong, and they are both likely to prove of considerable service.

Burdwan Division.

77. *Midnapur Government Estates.*—Naini Tal potatoes were experimentally cultivated in the Doro khas mahal in the subdivision of Tamluk, and some seed potatoes were distributed to raiyats of the estate. The experiments were fairly successful, and the raiyats expressed themselves pleased with the results they obtained

Hughli Government Estates.—In khas mahal Mozpur of the Serampur subdivision an experiment was made with Naini Tal potatoes with complete success, but the produce was sold at a low price owing to the want of a market for this class of potato. Potatoes of one of the best country varieties should be tried this year. Experiments with various kinds of seeds obtained from the Himalayan seed stores, Mussoorie, were made in the Arambagh (Jahanabad) subdivision with fair results.

Presidency Division.

78. Very little was done in the way of direct agricultural experiments in this Division. Potatoes were grown in some of the Government estates in the districts of Murshidabad, Jessore and Khulna with indifferent success.

Babu Charu Krishna Mozumdar, a leading zamindar of Islampur in Murshidabad, made some interesting experiments with potatoes, *cassava*, sugarcane, and other crops, and has favoured me with a report on the results attained by him. This gentleman has cultivated his potatoes at a profit and has done much to encourage their cultivation in his neighbourhood. He has also contrived to preserve seed potatoes of the Naini Tal variety through the hot weather and the rains, a matter of considerable difficulty. The further development of this gentleman's experiments will be awaited with much interest.

Rajshahi Division.

79. The proposal to open a small agricultural farm in the Jalpaiguri district was not approved by the Commissioner, Mr. Nolan, who considered the site chosen to be too malarious and inaccessible for the purpose. The scheme for a small cattle-breeding farm appears also to have been temporarily abandoned, owing to the difficulty experienced in selecting a suitable site.

Some very successful experiments were conducted with tobacco and hill potatoes in the Jaipur estates in Bogra, selected seed being issued to raiyats who took much interest in the cultivation of the crops and secured an excellent outturn. Some sugarcane-crushing machines were also purchased, and three bulls were imported for the improvement of the breed of cattle.

The potato experiments made in the Maldwar Ward's estate in Dinajpur proved unsuccessful, and the purchase of two Hissar bulls for breeding purposes was ineffectual owing to the inferior quality of the animals sent down to us from the Hissar farm. This matter is the subject of separate correspondence and a representation will be made to Government on the subject. One of the bulls died and will be replaced, free of charge, by the Veterinary Department.

On the other hand the agricultural experiments made with various crops, including potatoes and wheat, in three wards' estates in the district of Rangpur have had such good results as to induce the raiyats to extend their cultivation of these crops. These experiments have cost very little, and seem likely to prove of lasting benefit to the estates in question.

A good deal of excellent work was done in the Government estates of the Darjeeling district for the encouragement of agriculture. Bulls were imported and freely distributed, tanks were dug to assist the raiyats in steeping their jute, and various minor works were undertaken with considerable success.

In Pabna two excellent bulls have been imported, and their services are much in request. Some experiments with potatoes in this district met with fair success.

Dacca Division.

80. Some fairly successful experiments were made with the Naini Tal potato in the Government and wards' estates of the Faridpur district. These experiments have attracted some attention in the neighbourhood and should be persevered in.

The proposal to start a small experimental farm in the Jamalpur subdivision of the Mymensingh district was dropped and the money that had been made available for the purpose was expended on the purchase of a couple of Hissar bulls for breeding. These bulls have arrived in the district, but it is too early as yet to report how far they are likely to prove useful. Particulars were obtained during the year of the work done on an excellently managed private farm maintained by one Babu Iswar Chandra Guha in the neighbourhood of Jamalpur. This gentleman is a scientific agriculturist who is doing a good deal to introduce new crops into the district by means of his demonstration farm. The raiyats of this part of Mymensingh are, however, already expert agriculturists, and make the most of their lands by careful manuring, and Mr. A. C. Sen, the District Judge of Mymensingh, himself an authority on the subject, is of opinion that we cannot do much to help them. I understand that Mr. Sen has recently started an Agricultural Association in Mymensingh itself, but have no definite information as yet upon the subject.

A good deal has been done during the past few years to spread the cultivation of potatoes in the Backerganj district, and Mr Beatson Bell, the Collector, has taken much interest in the introduction of this crop, as well as of tobacco and English vegetables. The people are prosperous and make very large sums out of their paddy crop every year, but there is no doubt an opening for the cultivation of *rabi* crops, and there is every reason to suppose that potatoes and tobacco can be grown with considerable profit, if the people will make more use of manure and take the trouble to study the proper methods of cultivating them. The introduction of iron mills for pressing sugarcane, and the improvement of the quality of the jute of the district, to which I have referred elsewhere, are also matters worthy of attention.

Chittagong Division.

81. Experiments were made in both Government and wards' estates in Chittagong with various crops, such as tobacco, sugarcane, potatoes and vegetables. These experiments suffered from the exceptionally heavy rain in October and from other drawbacks, and the potatoes and vegetables did badly. Sugarcane is, however, expected to give good results. It is proposed in future to abandon the isolated experiments in all these estates and to concentrate attention upon the experimental farm that has recently been started at Nasirabad in the neighbourhood of the town of Chittagong. An excellent site has been chosen, the land has been levelled and laid out with care, and complete arrangements have been made for irrigation. The farm will only be brought under regular cultivation in the current year, but oats were sown as a catch crop to occupy the land during the last *rabi* season. The crop was, however, sown too late and did not succeed. The sugarcane that has since been planted promises well, and crops of maize, jute and *aus* paddy now occupy the ground. Mr. J. H. Lea, the Collector, has taken considerable interest in the opening of this farm, and it has been supervised by the Khas Tahsildar, Babu Romesh Chandra Singha, with much care.

Two Hissar bulls have been imported into the district during the year.

Some experiments in the Government and Wards' estates of the Noakhali district met with some success. Although heavy rain in October and November

spoilt the prospects of the potato crop, tobacco and other *rabi* crops gave very fair results.

Patna Division.

82. Some miscellaneous experiments were conducted in the Government and Wards' estates in the Patna district, in the Deo estate in Gaya and in the Narhan ward's estate in Darbhanga, with fair success, but the crops suffered from severe rain and hail in January and February. Mr. Wheeler, Collector of Darbhanga, makes some pertinent remarks as to the scope of such experiments, and points out that they cannot be supervised with sufficient care to render any comparison of the effects of different manures or of different systems of cultivation of much value. He suggests that all that should be aimed at is the demonstration of the value of certain new crops or new varieties of old crops, which have already been successfully grown in our farms or elsewhere. Mr. Wheeler has rightly interpreted the aims of the Department in his remarks. It is impossible for the Managers of Government or Wards' estates to carry out exact and difficult experiments, and we are only anxious that they should assist in the introduction of suitable new crops, and of suitable new varieties of old crops, such as paddy, jute, wheat and the like. While they are almost bound to fail in obtaining any information of real value from original experiments, they can utilise such information as can be made available to them through this Department in selecting and cultivating new crops and demonstrating their value to the raiyats of their estates.

In the Hathwa estate in Saran a considerable sum of money was spent during the year in laying out the lands of the new farm at Sripur, and a complete plan was prepared for its working. It is intended to be a cattle-breeding farm with a small area of cultivation attached to it. Part of the area of cultivation has already been laid out as an experimental farm, and the Overseer of the Dumraon farm was transferred to Sripur to take charge of the experiments started in it, and of the cultivation of catch crops in a part of the rest of the farm, which is eventually to form a portion of the cattle paddocks. A most unfavourable season interfered with the experiments and reduced the outturn, but the sugarcane has done well up to date, and as soon as the farm can be got into full working order, it should be able to give valuable results. The main scheme for a cattle-breeding farm is at present under the consideration of Government, and nothing can be done until an officer has been appointed as Manager who will take over the whole of the executive control of the farm and supervise all the details of the operations conducted upon it.

A small home farm has also been opened in the close neighbourhood of the town of Gaya, on lands belonging to the Tikari ward, and considerable progress was made during the year in the laying out of the farm, the erection of buildings, and the sinking of wells, and some successful experiments were made in a small area with tobacco and potatoes. An overseer from the Saidapet College has now been appointed, and the dairy attached to the ward's residence will shortly be transferred to the farm. Great interest is taken in this work by Mr. Ogilvy, the Manager of the estate, and it is hoped that the farm may prove useful and profitable in the near future.

Bhagalpur Division.

83. The cultivation of Naini Tal potatoes was tried further in the Government estates of this Division, but was only successful in one district, Monghyr. The failure of this crop in Bhagalpur and Purnea was attributed to the unsuitability of the soil, but there appears to be no reason why a good country variety of potato should not succeed, and the Managers of these estates will be asked to substitute the Patna for the Naini Tal variety in the current year. Muzaffarnagar wheat was grown with success in Monghyr, but an experiment with tobacco proved a failure.

The only experiments of importance in wards' estates were those in the Khagra wards' estate in Purnea, where the Manager, Mr. A. C. Rolt,

who is an eminently successful horticulturist, is doing a great deal for arboriculture and in the matter of the extension of cultivation. He conducted a satisfactory experiment with *janera* during the year, but the results of his experiments with oats and wheat were disappointing. The mango, *lichi* and *eucalyptus* plantations started by him are all doing well. In the Sonthal Parganas a fairly successful experiment with Naini Tal potatoes was conducted in the Sankara estate, and various small experiments with plants and seeds purchased from the Agri-Horticultural Society were carried through with varying results.

Orissa Division.

84. *Cuttack Government Estates.*—The *shamsara* sugarcane, Mokameh castor and potatoes were cultivated with fair success in the Banki Government estate, but the potatoes suffered from blight owing to foggy weather. The outturn from the castor seed was poor, but the quality of the crop was far superior to that obtained from local seed.

Cuttack Wards' Estates.—Various experiments were carried out in the Madhupur, Kanika and Kujang estates. Sugarcane was again successful in Madhupur and did well in Kanika. It failed in Kujang, and I fear that the soil may prove to be too much impregnated with salt for this crop.

Fodder crops were grown successfully in Kujang, and the sweet potato succeeded extremely well in Kanika. This last experiment will be extended to other estates in the current year.

Puri Government Estates.—The few small experiments made in the Puri Government estates suffered, in common with all the crops around them, from the unfavourable character of the season, but the growing of *kulthi* on lands recently abandoned by raiyats as being useless was so successful that these lands have again been applied for by tenants for cultivation in the present season.

Angul Government Estates.—Through the personal interest and energy of Mr. McLeod Smith, Deputy Commissioner of Angul, a small model farm was opened here in March 1899. An especially unfavourable season affected some of the crops grown, but it is reported that cotton, *arhar*, castor seed, *brinjals* and wheat were cultivated with success, and that the raiyats of the district visited the farm in large numbers and displayed much interest in the improved methods of cultivation exhibited to them.

Narsingpur.—A bad season prevented much being done with the agricultural experiments in the past year. A large number of crops were tried both in the home-farm and by raiyats. The best results are said to have been obtained from the Garo Hills cotton, Mokameh castor, wheat, maize and *arhar*.

Baramba.—Some promising experiments with sugarcane are in progress, but unfavourable weather precluded success in some experiments with maize and potatoes.

Talcher.—A small model farm was started during the year, in which the minor chief evinced some interest. Potatoes, onions, sugarcane, wheat and maize were tried with fair result. Experiments in the cultivation of *dalua* paddy were also made by the Manager with success.

Dhenkanal.—The Korea experimental farm started in the previous year was worked up during the year with better results. The Manager was successful with maize, paddy, potato, onions, vegetables and sugarcane. Some other crops, among which were jute, cotton, wheat and tobacco, failed owing to late sowing and insufficient rainfall.

Pal Lahera.—A piece of forest land was reclaimed for a model farm. Experiments were successfully made with vegetables, cabbages, Dumraon *arhar*, potatoes, maize and Egyptian cotton. The quality of the produce obtained from the three latter was specially good, the potatoes being large and well formed, while the cobs of corn and the pods of cotton were superior to anything obtainable locally.

Chota Nagpur Division.

85. The report received of the various agricultural experiments that have been initiated in this Division is somewhat incomplete. Nothing has been said

as to the small farm that has been started in the Dhanwar ward's estate in Hazaribagh or as to the plot of experimental cultivation in the town of Chaibassa. Some small experiments have been made with varying success with hill potatoes in Ranchi, Palamau and Manbhum, but want of irrigation and of experience in the cultivation of the crop prejudiced the outturn. There seems to be no reason to suppose that the Patna potatoes could not be grown successfully in many parts of the Division, and I am glad to see that it is proposed to persevere with the experiments. The introduction of root-crops is likely to prove of some value to these districts, where they are almost unknown at present. The Commissioner will be asked to favour me with a more full report in the current year.

Experiments made by the Agri-Horticultural Society of India.

86. The Secretary to the Agri-Horticultural Society of India has favoured me with a copy of his report on the operations of the Society during the past year, from which I reproduce here the following extracts:—

Rhea, Tapioca and the Sisul hemp have been planted out on a portion of the land unsuitable for other purposes. Amaryllis cultivation has also been attended to and many varieties with large desirable flowers have been crossed and the seed sown, resulting in a fair crop of seedlings, which, however, are yet too young to flower.

Owing to the heavy rains a large portion of the Rose section suffered severely.

In the fruit section there have been a few additions of desirable kinds of Mangoes. The young trees of Cherimoyer (*Anona cherimolia*) planted out in 1897 are now about 20 feet high, but have not flowered. Propagation was again attempted, but without success. The Sour-sop (*Anona muricata*) has also grown to a similar height, but did not, as was expected, flower. The stock of the species from the Upper Congo has been almost disposed of. The seedlings planted out are doing well.

The plantation of Pineapples has thriven, but only the "Singapore" variety fruited. A specimen fruit of "Giant Kew" was received from Mr. Helps of Baintbarri, Jalpaiguri, and was exhibited at the November Meeting, when it turned the scale at 16 lbs. and measured $9\frac{1}{2}'' \times 7''$. The flavour was excellent and, except the skin, the entire fruit was edible.

The seedlings of the Fiji Papaya, alluded to in the last Report, were planted out at the Nursery in July, but all perished except one, which turns out to be a male plant.

The American Dewberry (*Rubus trivalvis*) after great attention produced a small crop of excellent fruit, about the size of a marble and far superior in flavour to those reported on last year.

The stock of fruit-trees was increased by planting out young grafts of various kinds of Oranges, Lemons, Limes, Pomelos, Citrons, Mangoes, also a few Bilimbi and Marian.

The table Fig, Vine and Pear still prove unsatisfactory. The two former though easily propagated invariably perish in the rains, while the Pears have not grown since they were planted out.

The Chinese and Japanese varieties of Peach perished in the rains.

In the Experiment section there is little success to record, owing to damage done by heavy rain. The two varieties of Egyptian cotton "Abassi" and "Affifi" again gave excellent results in spite of drought in the hot weather and floods in the rains. Samples of both varieties were sent to Messrs. Wolstenholme and Holland, Liverpool, and were valued at $4\frac{1}{2}d.$ and $4\frac{1}{4}d.$ per pound, respectively. A quantity of seed of both kinds was offered to anyone desirous of cultivating these varieties, but the offer was not availed of.

Beyond the usual digging up of the plots and sowing of the seed, no special care was taken of the Cotton plants in the way of watering or manuring the ground.

An experiment in manuring the various Coffee bushes in the Society's garden, commenced in November 1898 as reported in the Journal and Proceedings, page 986, for April to June 1899, has resulted as follows:—

		lbs.	oz.
Bush A.—Arabian coffee, unmanured, yielded in berries		0	$11\frac{1}{4}$
„ *B.*— „ „ manured with 2 tablespoons of ichthemic guano yielded in berries		1	$3\frac{1}{2}$
„ *C.*— „ „ with 4 tablespoons of bonemeal yielded in berries ...		1	12
„ *D.*— „ „ 3 tablespoons each of bonemeal and ichthemic guano yielded in berries		2	5
„ *E.*—Liberian „ unmanured yielded in berries		0	5
„ *F.*— „ „ manured with 3 tablespoons of bonemeal and ichthemic guano yielded in berries		0	$9\frac{1}{4}$

All the bushes are over ten years old, and the branches were not excessively pruned. The average annual yield has hitherto been 10 ounces per Arabian and 6 ounces per Liberian coffee bush.

The combination of bonemeal and ichthemic guano has resulted in a large increase in the yield of berries, but it would be premature to recommend the treatment of coffee on a large scale until a thorough test has been made of the results for another two or three years.

Experiments in the cultivation of the Vanilla were taken up in earnest last year. Young plants a year or two old were put down at the roots of several mango trees in the rains of 1897. Last year one of these flowered in the month of April and the flowers, 19 in number, were fertilized, the pods ripening in December. All pods were gathered as they became ripe and were sun-dried in flannel, developing by the end of the month the characteristic aroma and colour, but owing probably to the sudden stoppage of the rains the majority of the pods were somewhat poor. A fuller report regarding Vanilla cultivation will appear later in the Journal. There would appear to be no reason why Vanilla cultivation should not be successful to a limited extent in Lower Bengal and in similar humid localities.

The cultivation of the Florida Velvet Bean was continued last year, but it in no way proved superior, as regards quality or produce of beans, to the indigenous species [*Kamach* (*Cowhage*), *Mucuna pruriens*] growing in its natural state close by. As a fertiliser it was not tested, as the plantation was swamped early in the rains and all plants died.

In the experiment with Yams from Barbadoes and Natal, the former proved most palatable when lifted and cooked last month, while those from Natal were exceedingly coarse. The cultivation of the Barbadoes variety has been extended by planting the tops, but the stock is very small at present.

There has been a large demand for Sanseviera roots, while a limited number of Agaves and Rhea have been indented for.

As usual, a quantity of seeds of various kinds was distributed, but no results have been received to date.

During the year several clumps of the Giant Bamboo flowered and yielded seed, some of which was distributed and the balance sown. After seeding the clumps died and at present there are indications of other clumps flowering in the coming hot weather.

Three kinds of weed-destroyers were received for experiment—(1) "Acme Powder Weed-killer," (2) "Eureka Weed-killer," (3) "Scrub Eradicator." All three were used on the Garden paths during the rains. The "Acme" soon killed all weeds and grass, but the other two, though destroying weeds and surface-rooting grasses, only checked for a short period the growth of *Cyperus rotundus*, known as "*Motha*," which has its bulbous roots deep in the soil, and *Imperata arundinacea*, the "Ulu-ghas," which also roots deep. Babu Lalit Mohun Sinha Roy reports an unsuccessful experiment with the "Scrub Eradicator" on a stretch of "Ulu" grass growing on his estate at Chakdighi in the Burdwan district. To ensure success it is necessary to use weed-destroyers in wet weather.

Experiments with "Ichthemic Guano" were carried out extensively during the past year with excellent results. Ferns, Begonias, Amaryllids, Crotons, Dracænas, Anthuriums, Roses, Palms, &c., were treated with the Guano. The foliage plants made remarkable growth in the rains, all leaves being large and well coloured. Among flowering plants the manure was used chiefly in the cold weather and well developed flowers were produced in abundance, but somewhat late. Many persons appear to think that the use of this Guano causes legginess in plants, especially Annuals, but it is probable that only a few doses of the liquid, or one or two applications of the powder, have been given, and that the supply has not been kept up according to instruction. The experiment will be conducted during 1900.

* * * * * * * *

During the hot weather, from the commencement of March to the breaking of the rains, the Aermotor proved of the greatest value, pumping on an average in working hours, *i.e.*, from 6 A.M. to 11 A.M. and from 2 P.M. till 6 P.M., 5,000 gallons daily. With storage tanks and the construction of 2,000 feet more of *pucca* drains, the utility of the Aermotor would be greatly enhanced. Owing to the low altitude of the winter breezes, about 40′-50′, and the height of the fans of the machine, 75′, it rarely works during the winter months, or from the middle of October to the middle of February. A mill on a 40′ tower would prove of great service in the cold weather when the tanks begin to run down and difficulty is experienced in raising water to the surface.

Trial of improved Agricultural implements in Government Wards', and Private Estates.

87. The implements distributed to different persons during the year under report were three Sibpur ploughs, two Baldeo ploughs, one Kaiser plough, five Meston ploughs, one chain-pump, four Burdwan spades, one Nahan's kibbling machine, and one shallow evaporating pan. An account of various new or improved implements that have been tried during the year is given in Appendix II, which has been prepared and attached to this report in accordance with the orders of the Government of India. The list is a short one, and contains nothing very promising. The Behea and other iron sugar mills continue to grow in popularity.

In addition to the implements mentioned in this list it may be noted that an aermotor has been worked successfully in the gardens of the Agri-Horticultural Society (see the preceding paragraph), and that we have now purchased one of these machines and have had it erected at the Sibpur Farm, where the Principal of the Civil Engineering College has kindly promised to make careful experiments for us. As soon as arrangements have been completed by the

construction of a tank for storage of the water raised, experiments will be made to test the velocity of wind required for the machine and the amount of water it can lift.

Two or three machines for the decortication of fibre have been recently exhibited and advertised largely in Calcutta, but I am not aware that any of them have as yet been brought into practical use.

The Ghatak rice-husking machine that attracted much attention at a recent Industrial Exhibition in Calcutta has not hitherto proved successful when tried with the finer sorts of paddy, and has not been manufactured as yet for sale.

Supply of Seeds, Manures and Implements.

88. A list of seeds, implements, manures, etc., distributed by the Department during the year under report (exclusive of those used in experimental farms) is given in Appendix III.

Crop-cutting experiments by District Officers and Settlement Officers.

89. The next quinquennial report on the results of the crop-cutting experiments annually carried out in the districts of these Provinces is due to Government in the year 1903. In the meantime the results of the experiments made in 1897-98 and 1898-99 have been reported to me and have been compiled in a convenient form in my office. The returns for the past year are now coming in.

Crop-cuttings in jail gardens.

90. Only 39 cuttings were made in 18 jails during the past year, and the results did not show that these experimental cuttings had been made with much care, or that any great degree of interest had been taken in the work. They were the last of their kind, as all such cuttings have been discontinued in the present year. The results of the experiments were summarised by Mr. Maddox in a note dated 30th December 1899, copies of which were duly submitted to Government.

Locusts and other Insect-pests.

(*1*) *Locusts.*

91. Locusts have been observed in small numbers in the three western divisions of the Province on several occasions during the year, but appear to have done little or no damage to the crops. On one occasion they are said to have slightly damaged the *makai* and paddy crops in the Jamui subdivision of Monghyr, and on another they appear to have done some injury in the Siwan subdivision of the district of Saran.

(*2*) *Other Insect-pests.*

92. The large majority of district officers report that their districts suffered no damage from insect-pests during the year. From Manbhum it is reported that paddy, *birhi* and *kalai* were injured by insects locally known as *suapokha* and *majhipokha*, but these have not been identified. Caterpillars have done much damage to indigo in many parts of North Bihar. An unnamed insect is said to have flourished in the Narhan estate in Monghyr in consequence of an excess of moisture in the soil, and to have done some damage to the *rabi* crops. Various insects are reported to have damaged crops in Cuttack, but I have been unable to identify them from the vernacular names given, and it is not stated whether the cultivators took any measures to get rid of them. In the Khurda Government estate in Puri some insects locally known as *jhintika* caused damage. This insect was identified as a grass-hopper, *Hieroglypus Furcifer Suss.*, well known as a destroyer of crops in other parts of India.

It was in Eastern Bengal that the only serious damage was done by insect-pests, and during the last rainy season a large variety of insects, caterpillars and grubs were forwarded to my office for identification. In all these cases Major Alcock, I.M.S., of the Indian Museum, rendered the Department valuable and ready assistance in the identification of specimens and

in suggestions for dealing with them. Among these insects were a cutworm found to destroy potatoes and peas in Noakhali, a caterpillar that damaged sugarcane in Kushtia, a Homopterous insect, said to belong to the family *Psyllidae*, that infested *pān* leaves in Backerganj, and the palm weevil (*Rhynchophorus ferrugineus*) that did damage to cocoanut palms in Noakhali.

The grass-hoppers that did so much damage in Midnapur and Singhbhum in the two previous years re-appeared this year in only a very small area in Midnapur, and we have not heard any more of the minute insect previously identified as *Leptocorisa Acuta*. An unidentified insect, locally known as *shái*, did damage to paddy and jute in Jessore. Among the specimens forwarded for identification were some beetles, identified as *Cicindela sexpunctata*, that are carnivorous and the deadly enemies of crop-eating insects. It is to the spread of these beetles that we must look for the mitigation of the damage wrought by the rice *hispa*.

This last-named pest, concerning which a special enquiry was made by Mr. Banerjei last year, again appeared in several districts of Eastern Bengal in the rainy season of 1899 and did much damage to the paddy crop in several districts, notably in Jessore, Noakhali, Khulna, Tippera and Backerganj. In the last named district they disappeared after some sunshine in August. Major Alcock is continuing his study of the life history of this insect in the hopes of discovering some efficient remedy against it. The remedies that have been hitherto tried have not proved very successful, tobacco decoction proving too expensive to use in any quantity and of doubtful efficacy, and the plan of dipping the seedlings in a mixture of assafœtida and aloe water before transplanting being somewhat elaborate for the ordinary raiyat. I am not aware whether a third remedy which has been suggested, the application of common salt, or the fumigation of the crop with a mixture of salt and sulphuric acid, has been tried in these districts. It was reported that it had proved effective in Hooghly and Burdwan, and was recommended by the Department for trial in Eastern Bengal. This insect causes more damage than any other that has been brought to our notice during the past few years, and I hope that further experiments may give results of greater value in the present rice season.

Sericulture.

93. The active work of the Silk Committee was confined, as in the previous year, to the silk-rearing districts of Malda, Birbhum and Murshidabad. The three scholarships founded at the Rampur Boalia Industrial School in the Rajshahi district were continued. The work of teaching has lately been extended by the appointment of a sub-overseer for the Baralpur *joars* of this district. The number of rearers in the Malda district, who were under the regular tuition of the Superintendent, Babu A. K. Ghose, or who conducted their rearing work under Pasteur's system, increased from 31 in 1898-99 to 47 in the year under report. In the Birbhum district, where the teaching work is conducted by an overseer, the number of such rearers rose from 18 to 25. In the Murshidabad district, which is worked by sub-overseers, the number rose from 8 to 34. A very much larger number of rearers kept microscopically examined seed and followed Pasteur's system under the supervision of the Superintendent and his overseers.

The total outturn of cocoons raised during the year by rearers under the Superintendent's supervision amounted to about 1,561 maunds, or 78,000 kahans, and the quantity of selected seed used for the purpose amounted to 912 kahans. The average return per kahan of selected seed was 85 kahans as compared with 83 kahans in the previous year, and with 50 to 60 kahans, which was the usual average recorded before the commencement of the Silk Committee's operations. The cocoons fetched the highest prices in the district, varying from Rs. 30 to Rs. 44 per maund. Cocoons were also raised under the overseer's supervision in Birbhum from microscopically examined seed, a large proportion of which was sold to other rearers. The practice of sulphur fumigation was still further extended, and it is satisfactory to note that there was scarcely any outbreak of *muscardine* in the rearing houses where this preventive was resorted to. Thirty fresh microscopes were purchased from Europe, of which 16 were disposed of to Malda rearers on the system of

payment by instalments. Some of the more capable rearers who purchased microscopes have commenced a business as buyers of microscopically selected seed, which they sell at higher prices to other rearers. The value of all kinds of appliances sold to these rearers amounted to Rs. 2,182, of which sum Rs. 1,198 have already been recovered. Some rearers of the district were induced to procure licenses at their own expense for the purchase and sale of sulphur in order that other rearers might be able to obtain this very necessary article at more moderate rates than those charged by the local licensed vendors. No microscopes were sold in the Birbhum or Murshidabad district, but some were taken on loan. Nine seed nurseries were started in Malda under the supervision of the Superintendent. The total receipts of the Silk Committee during the year amounted to Rs. 9,718, and the total expenditure to Rs. 8,669.

The report of the Silk Committee for the year under review, of which I have been favoured with an advance copy, is a record of successful work in every direction. The work of teaching progressed rapidly, the Superintendent, Babu A. K. Ghose, continuing to show much capacity and energy in carrying out this part of the work. Many rearers learnt the use of the microscope thoroughly, and were found capable of examining seed for themselves. Pasteur's system of selection and rearing of seed has undoubtedly made a distinct advance in all the rearing districts which have come under the influence of the Silk Committee's operations. The members of the Committee are also to be congratulated on the very creditable balance sheet shown during the second year only of their work. The first year showed a deficit of Rs. 782, which had to be made up by Messrs. L. Payen & Co., but the present report shows a balance to the credit of the Committee of Rs. 1,049.

94. The Rajshahi Diamond Jubilee Industrial School has made steady progress in its sericultural work during the year under review. There was a large increase in the number of students, which rose from 38 in the previous year to 54 (37 Hindus and 17 Muhammadans) in the year under report. Of the latter 47 joined the rearing and the rest the dyeing and weaving department. There were 27 students (18 Hindus and 9 Muhammadans) at the end of the year, the remainder having left at various times, when they considered that they had obtained sufficient instruction for the purposes of their work. The final examination was held in March 1900. Twenty-two students of the rearing department (15 Hindus and 7 Muhammadans) appeared at this examination, all of whom passed, 16 being placed in the first and 6 in the second division. Two extra students also sat at the examination, both of whom passed with credit. Mr. N. G. Mukherji, who examined the written papers, in communicating the result of the examination to the Chairman of the District Board, remarked :—"The papers were *very satisfactory*, and the silks spun and reeled also give evidence of careful training."

Students of the school were deputed from time to time on the application of villagers to help them in scientific seed-selection and to stop an outbreak of muscardine which swept away silkworms in several rearing centres of Rajshahi. In both cases, the students seem to have achieved considerable success. The head-master also was sent out from time to time on inspection and was specially deputed to inspect the rearing centres in Bogra. He also attended the Industrial Exhibition in Calcutta, where he demonstrated, with the help of a student, the methods employed in scientific sericulture. Two trained students with the necessary appliances were deputed to the Industrial and Agricultural Exhibition at Vishnupur in Bankura, where the work in demonstrating the methods of scientific sericulture and *matka*-weaving was rewarded by the presentation to them of a gold medal. There was also a silk exhibition held at the school during His Honour the Lieutenant-Governor's visit there. Some25 rearers from the interior of the district visited the school during the exhibition and received information regarding the scientific methods adopted in the school. Experiments were made in the school during the year in rearing, reeling, bleaching, dyeing and weaving, and all the processes employed in these operations were explained to the students. I inspected the school in July 1899 and took notes of some of the chief requirements of the institution in the shape of microscopes, &c., which have since been supplied to the school.

The year 1899-1900 opened with a balance of Rs. 6,396 to the credit of the district fund and contributions to the amount of Rs. 2,823 were received

during the year, which brought the total receipts for the year to Rs. 9,219. The disbursements amounted to Rs. 5,065, and the year closed with a balance of Rs. 4,154. Free quarters for the head-master and a boarding-house for students were constructed during the year, while the plans and estimates for the school-house and workshops having been finally sanctioned, their construction will be shortly taken in hand. The Government of India having offered to place the sum of Rs. 2,000 at the disposal of the Government of Bengal for some suitable work of agricultural improvement, I recommended that this sum should be granted to the school for the erection of a masonry building to be used as a special seed-house. The grant was sanctioned and the house was erected before the close of the year. The remarkable advance of the school is largely due to the excellent work done for it by the Honorary Secretary of the Committee of the School, Babu A. K. Maitra, B.L., who has spared neither time nor trouble to further the interests of the institution, and has managed its affairs with noticeable success.

Arboriculture.

95. *Date-palms (Phœnix Sylvestris).*—A full account was given in paragraph 107 of my last Annual Report as to the circumstances in which certain experiments in the cultivation of date-palms were undertaken in the Chota Nagpur Division, and in the districts of Shahabad and Patna in the Patna Division. These experiments have hitherto proved unsuccessful everywhere, except in Shahabad, and the reports recently received from the district authorities confirm our previous experience.

I have already referred, in paragraph 83 above, to the good arboricultural work that is being done by Mr. Rolt, Manager of the Khagra Ward's estate in Purnea. The Eucalyptus trees (*Eucalyptus Globulus*) planted in Hazaribagh are doing well, and are reported to be about 100 feet high, with a circumference of 5½ feet and 5 feet at heights of 1 foot and 6 feet from the ground, respectively. The experiments which are being made by the Forest Department with the *Divi-divi* tree (*Cæsalpinea Coriara*) in the Sonthal Parganas have progressed fairly satisfactorily during the year, but the Deputy Conservator of Forests has come to the conclusion that the trees do not thrive well when transplanted, and he accordingly proposes to grow them from seed in the plantation itself, without transplantation, in future.

CHAPTER VI.

AGRICULTURAL EDUCATION.

96. *Agricultural classes at Sibpur.*—The Principal of the Civil Engineering College at Sibpur has not favoured me, as he did last year, with any special note on the working of these classes. The Director of Public Instruction has been kind enough, however, to forward for my perusal Mr. Macdonell's report on the general working of the College during the past year.

The original scheme was that the course at the College should last for one year only, the students spending a second year in practical work, under the supervision of the Director of Land Records and Agriculture, on various farms and on Government and Wards' Estates in the mufassil. In accordance with this scheme, the first students in these classes, who entered upon their Agricultural course at the College in July 1898 and completed it in July 1899, were employed during the year in various districts under the direct supervision of the Collectors or of the Managers of the estates upon which they worked. They appear to have been industrious on the whole and to have done some intelligent work, and since the close of the year the majority of them have passed a fairly severe examination intended to test their practical knowledge of the various subjects they have been studying during the past two years.

During the past year the scheme of education in these classes has been changed, the course at the College has been extended to two years and the practical training outside the College will be confined to such as can be arranged for during the long vacations. At the commencement of the second year of these classes, in July 1899, there were 41 applications for admission

to the Higher Class and 11 for admission to the Lower, and out of these 15 were admitted to the Higher, and 6 to the Lower, Class. Of the former, two did not prosecute their studies throughout the year, but all the six students in the Lower Class persevered. The students appear to have done fairly well at the intermediate examination recently held. Unfortunately the conduct of the farm attached to the College has not been successful during the year, and this has probably had some effect upon the working of the classes. Steps are being taken to remedy this defect.

On the whole the agricultural classes are doing well and are already beginning to attract students It will be interesting to see how the first who have obtained diplomas in Agriculture succeed in their subsequent careers. Some few of them will obtain Government service and it is much to be hoped that others will obtain employment as Managers in private estates, where their knowledge of agriculture would undoubtedly be of value.

97. *The Bengal Veterinary College.*—The past year was the first since the promotion of this institution to the status of a College. Of the 16 students who studied in the new third-year class, 15 were successful in obtaining diplomas as Graduates of the College, a highly satisfactory result. The Annual Report on the working of the College which has been submitted by Veterinary Major Raymond, the Principal, and recently forwarded to Government, shows that the high standard of efficiency in teaching that has characterised this institution in the past few years has been fully maintained in the year 1899-1900.

CHAPTER VII.

PUBLICATION OF AGRICULTURAL INFORMATION.

98. A monograph by Mr. N. N. Banerjei, Assistant Director, on 'The Woollen Fabrics of Bengal' was published during the past year, and a full and valuable mongraph was prepared and submitted by Mr. N. G. Mukherji, Agricultural Lecturer in the Sibpur College, on 'The Silk Industry of Bengal.' This latter monograph will probably be published as a special double number of the Indian Art Journal. Bulletin No. 5 of 1899, "Agave Sisalana," was also published by this Department during the year under report.

99. The following forecasts of harvests, special reports of crops, agricultural statistics, and other agricultural reports were prepared and published by the Department during the year under report:—

(1) Report on the outturn of the *rabi* crops of 1898-99.
(2) Preliminary and final reports of the jute crop of 1899.
(3) Preliminary and final reports of the *bhadoi* crop of 1899.
(4) Preliminary and final reports of the winter rice crop of 1899.
(5) Preliminary and final reports of the sugarcane crop of 1899.
(6) Report on the early and late cotton crops of 1899-1900.
(7) Preliminary and final reports of the indigo crops of 1899.
(8) Final report of the wheat crop of 1898-99 and statement of prices of food-stocks and preliminary forecast of the wheat crop of 1899-1900.
(9) Final report of the oilseed crops of 1898-99 and preliminary forecast of the oilseed crops of 1899-1900.
(10) Tables of agricultural statistics for 1898-99, comprising Table A(i) and Table A(ii).
(11) A consolidated table showing the average wholesale prices of food-grains, firewood, &c., in the principal marts of Bengal for the year 1898-99.

The above crop forecasts and agricultural statistics were printed and were distributed, as in the previous year.

In addition to the above—

(1) Statistics showing the production of minerals and gems;
(2) list of prices of *ghi*, potatoes, mustard oil, cocoanut oil, firewood, bamboos, bricks and lime; and
(3) a return of crop-cuttings made in jail gardens—

were also prepared.

CHAPTER VIII.

FINAL.

Emigration to Burma.

100. Government has continued to grant a subsidy towards the cost of the conveyance of State emigrants to Burma during the year. The figures below show the number of such emigrants that have travelled to Burma during the past six years:—

1894-95	...	...	304	1897-98	...	...	363
1895-96	...	...	136	1898-99	...	...	253
1896-97	...	..	241	1899-1900	...	...	570

The large increase in the past year is due to some extent to increased efforts on the part of the lessees of the grants to which these emigrants go to induce people to emigrate. I understand that the leases are drawing to an end, and that, in one case at least, the conditions as to clearance which would entitle the holder to a renewal of the lease have not been fulfilled, so that he is anxious to increase the labour force on the grant with the least possible delay. I received reports, unofficially, in the course of the year as to the present condition of the grants leased to Messrs. Thomson and Mylne of Behea, and the late Rai Jai Prokas Lal Bahadur of Dumraon, from which it would appear that the emigrants are thriving, and that the scheme of emigration initiated by these gentlemen is progressing slowly but surely.

Agricultural Exhibitions.

101. The following exhibitions were held during the year, and grants of funds were made to some of them out of the allotment sanctioned by Government for that purpose :—

Name of place where exhibition was held.	District.	Government grant.
		Rs.
(1) Bishnupur ...	Bankura ...	100
(2) Suri	Birbhum ...	150
(3) Calcutta (Indian Industrial Exhibition).	Calcutta ...	150
(4) Kalimpong ...	Darjeeling ...	500
(5) Alipur ...	Jalpaiguri ...	200
(6) Falakata ...	Ditto ...	300
(7) Bera ...	Pabna ...	Nil
(8) Rukindipur ...	Bogra ...	200
(9) Sitamarhi ...	Muzaffarpur ...	100
(10) Berapur ...	Shahabad ...	Nil
(11) Tintanga ...	Bhagalpur ...	Nil
(12) Madhupur ...	Sonthal Parganas ...	100
(13) Cuttack ...	Cuttack ...	100
(14) Sonepur ...	Saran ...	Nil

A brief account of each of these exhibitions is given below :—

102. *The Suri Cattle and Produce Show.*—The objects of the exhibition are the improvement of the breeds of cattle and poultry, and the encouragement of the production of good vegetables and other produce in the Birbhum district. It was successfully started by Mr. Fischer, when Collector of the district, and promises to prove a most useful annual function. Mr. Ahmad, the present Collector, has taken it up with much energy, and the last exhibition, which was held on 12th to 14th February 1900, appears to have been a most satisfactory one. There was a much greater number of exhibits this year, as compared with the preceding year, and prizes were more liberally given to the exhibitors. The Ganutia Silk Factory sent samples of cocoons, and arrangements were made to show to the cultivators the different kinds of silkworms, their diseases, how to cure them, and how to improve their breed. Subscriptions, amounting to Rs. 2,074, inclusive of the Government contribution, were realised for the cost of the exhibition, while the disbursements amounted to Rs. 2,110-13,

thus reducing the balance in the hands of the Committee from Rs. 1,295 to Rs. 1,258-13-9 at the end of the year. One Hissar bull was purchased by the Committee last year and the Collector proposes to purchase another during the current year.

103. *Kalimpong Exhibition and Fair.*—The main object of this fair is to improve mule-breeding in Sikkim and Thibet. It has, however, contributed to the improvement of the breed of cattle and ponies in the neighbourhood and, to judge by the ninth exhibition, which was held on the 6th and 7th December 1899, its importance as a stimulus to the improvement of the agriculture of the district promises to develop rapidly. Mr. N. N. Banerjei, Assistant Director of Agriculture, and Veterinary Major F. Raymond, Superintendent, Civil Veterinary Department, Bengal, visited the fair this year. Both of them think that the exhibits on the agricultural side marked a great advance, both in quality and quantity, over those of the past years, while, on the other hand, the latter is doubtful as to the success of the fair in improving the breed of mules in the district. Veterinary Major Raymond remarks, however, that "the average size and quality of the mules show steady progress and they are now about as good as they are ever likely to be." Speaking of the agricultural exhibits, Mr. Banerjei says: "They made a splendid show and were certainly far superior to what I have been accustomed to see at some other exhibitions. The maize was particularly good; some of the specimens were just as good as the American maize." A noticeable feature of the exhibition was the distribution of carefully chosen seed and English poultry to the prize-winners in the grain and poultry classes, and I would draw the attention of other show Committees to this very practical way of rewarding prize-winners. This exhibition receives no less than Rs. 1,500 from public funds, the Civil Veterinary Department contributing Rs. 500, this Department Rs. 500 and the Darjeeling Improvement Fund Rs. 500.

104. *Calcutta Industrial Exhibition.*—This is the 7th exhibition held under the auspices of the Indian Industrial Association for the promotion of Indian agriculture, arts and manufactures. Hitherto this exhibition used to be held in connection with a local fair, known as the Mohan Mela, but this year it was held independently of it, and at the sole responsibility and risk of the Exhibition Committee. It was well advertised throughout India through the newspapers and by leaflets, and the results have not been disappointing. In former years the number of exhibitors did not exceed 380, but in the present year, the number rose to 580. In the agricultural and horticultural section of the exhibition, there were 84 exhibitors, who exhibited different kinds of vegetables, fruits and other agricultural products, as also various kinds of flowers. A sum of Rs. 680 was awarded in prizes to the successful exhibitors of this section, viz., Rs. 347 for vegetables, fruits and other agricultural products, and Rs. 333 for the different collections of flowers. A sum of Rs. 150 was granted by Government in aid of the Prize Fund, and a sum of Rs. 10,000 was also collected by voluntary subscription from the public for the expenses of the exhibition.

105. *Vishnupur Industrial and Agricultural Exhibition.*—This exhibition was inaugurated last year in the Vishnupur subdivision of the Bankura district, with the object of encouraging local industries and agricultural improvements. It was opened on the 6th of February 1900 and lasted for some days. A strong Committee, with the Subdivisional Officer, Babu Chandi Charan Chatterji, at its head, raised subscriptions and donations amounting to Rs. 9,599-8, out of which Rs. 8,912-2 was spent in organising the fair and in awarding prizes. There is a balance of Rs. 687-6 in the hands of the Committee. There were 122 exhibitors who brought 246 exhibits, most of which were indigenous products. Ten gold and 60 silver medals were awarded to the successful competitors in addition to prizes to the value of Rs. 500. Mr. D. L. Roy, Assistant Director of Agriculture, visited the show a few days after its opening and was much interested. The fair has made a good beginning and deserves encouragement.

106. *The Alipur and Falakata Fairs.*—The Alipur and the Falakata fairs were held in February 1900. The average daily attendance in the former was some 500 persons, and in the latter some 3,000 persons. The value of articles

sold in the former is estimated at about Rs. 3,000. The Government grant of Rs. 500 was expended in sanitary arrangements, in the erection of temporary huts and in providing entertainments of various kinds. These two small fairs are kept up for political reasons, with a view to encourage trade between Bhutan and the plains, and not on any grounds connected with agriculture. This year's fairs were not very successful.

107. *The Cattle Show at Bera in Pabna.*—This show was started within recent years for the exhibition of horses, ponies and cattle. This year's *melâ* was held in February last. Only 80 head of cattle, &c., were brought; they were rather poor specimens and no prizes were given. There were some horses and ponies, and these compared favourably with those exhibited in the previous years. Several of these competed in races for which prizes were given.

108. *Agricultural Exhibition at Rukindipur in Bogra.*—The object of this exhibition is to introduce agricultural improvements in the district of Bogra generally and especially in the Jaipur Government estate. The last show was held in November last and seems to have been a great improvement upon its predecessors, as is shown by the fact that the entries this year numbered 817, against 446 in 1898. A large number of small prizes were given to exhibitors of sugarcane, jute, paddy and other produce as well as to the exhibitors of articles of local manufacture. I have suggested to the local authorities that the prizes should be fewer in number and more substantial, and I must repeat what I observed last year in connection with this show, that voluntary local subscriptions should be raised to supplement the Government subsidy of Rs. 200 on which the fair at present entirely depends.

109. *Cattle Fair at Sitamarhi in Muzaffarpur.*—This fair was held on the 22nd April 1899 and was a success. One of the lecturers from the Bengal Veterinary College visited the fair and assisted the Judging Committee in the awarding of prizes. He estimates the total number of cattle at the fair to have been between 25,000 and 30,000 although the number actually exhibited was smaller than in other years. In some classes of cattle, the quality of the exhibits was better than last year, whereas in others they were fewer in number and not as good. Only Rs. 188 were distributed in prizes, the number being reduced owing to the paucity of exhibits. Prize-winners of previous years were excluded from competition this year.

110. *Barahpur Cattle and Horse Fair in Shahabad.*—The object of this show is to improve the local methods of agriculture and to stimulate improvement in the breed of cattle and horses in the Shahabad district. This year's exhibition was held on the 27th and 28th of February last. Veterinary Major Raymond, who attended the fair, reports that the number of cattle was smaller than usual, but that the quality of the horses and ponies shewed some improvement. The smaller ponies were not quite so good and the cattle were also of a rather inferior quality as a whole. A sum of Rs. 596 was distributed in prizes in this department. Mr. N. N. Banerjei, Assistant Director of Land Records and Agriculture, who also visited the exhibition, reports a falling off in the number as well as in the quality of the exhibits in the agricultural section. There were only 1,565 entries as against 1,915 of the preceding year. Rupees 385 were expended on prizes in this section. Some very good specimens of vegetables, flowers and local manufactures were exhibited.

111. *The Tintanga Agricultural Show.*—This is a small exhibition got up in connection with a local *melâ* in the Tintanga Government estate in Bhagalpur. It was held this year on the 14th of February 1900 and the two following days. From 8,000 to 10,000 people visited the fair this year. The object of the show is primarily to arouse the interest of the raiyats in agricultural improvements, and it is gratifying to note in the Collector's report that there has been some success in this direction. Rupees 272-2 were expended in awarding prizes for agricultural produce and live-stock. Altogether the show is reported to have been a success.

112. *The Madhupur Exhibition of Flowers and Agricultural produce.*—This exhibition was originally held in Cossipur, and was mainly an exhibition of flowers, fruits and vegetables. Since 1897 it has been held in Madhupur, where the proprietor has taken up about 32 acres of land, of which 25 acres are devoted to garden produce and flowers, and 7 acres to agricultural experiments. The twelfth exhibition was held on the 10th and 11th of February last.

A subsidy of Rs. 100 was given by this Department and was distributed in prizes for agricultural exhibits. His Honour the Lieutenant-Governor opened this year's exhibition, which was a great success. Mr. S. L. Maddox, the Officiating Director of Land Records and Agriculture, who visited the exhibition, remarked that in his opinion the show served useful purposes. The Sonthals attended in very large numbers on both days and not only visited the show itself, but went round the experimental farm as well.

113. *The Cuttack Exhibition of Flowers, Vegetables and Agricultural produce.*—This exhibition was instituted in 1898 as a show of fruits, flowers and vegetables. But in 1899 its usefulness was extended by adding agricultural and industrial products. There is a strong and influential Committee presided over by the Commissioner, in the compound of whose house the exhibition is held. This year's show appears to have been an advance over its predecessors, both in the quality and the number of the exhibits. Rupees 1,977-14-9 were collected for the expenses of the exhibition, out of which Rs. 1,158-15 were spent, including a sum of Rs. 578, which was set apart for prizes. This Department contributed Rs. 100 towards the Exhibition Fund. A Travelling Overseer of the Department was sent down with a collection of implements and produce from Bengal for exhibition.

114. *The Sonepur Horse and Cattle Fair.*—Owing to an outbreak of plague and cholera in the vicinity of Sonepur, the European camp and the cattle show were not held and the advent of pilgrims was discouraged, although the fair was not prohibited, and a large number of animals were brought to it. Veterinary Major F. Raymond, who visited the fair, reports that there were between 1,000 and 1,500 horses and ponies. The average quality of the horses was below the normal, while the ponies were about the same as usual. The market was bad for the dealers, as no Government purchases were made. The cattle were few in number and inferior in quality, but it is stated that trade was good. Veterinary Major Raymond took two of his students to the fair for purposes of instruction.

Applications for Patents for Inventions.

115. Twelve applications for patents of an agricultural character were received during the year under report from the Government of India for opinion. Five of these applications were for patents connected with the extraction and treatment of fibres; one for the improvement of raw silk; one for pressing hay into bales; one for an improvement in the manufacture of indigo; one for covers for wells of any shape or size; two for contrivances for boiling rice, and one for a paddy-grinding machine. The applications were sent to the Secretary to the Agri-Horticultural Society of India, who obtained the opinions thereon of Mr. H. J. K. Green, Member of the Institute of Civil Engineers, of Mr. W. R. Criper, Analytical Chemist, and of Mr. A. H. Abbott, of the Firm of Messrs. Octavius, Steel & Co.

Cost of Miscellaneous Experiments and Enquiries.

116. The cost to Government of agricultural experiments and miscellaneous enquiries conducted under the direct supervision of the Department of Land Records and Agriculture during the year under report has been Rs. 6,577-3, as compared with an expenditure of Rs. 6,155-11-9 in the year 1898-99. The details are as follows:—

	Rs.	A.	P.	Rs.	A.	P.
(1) Experiments other than those made in experimental farms ...				1,256	7	6
(*a*) Purchase of seed potatoes	385	12	3			
(*b*) Ditto Muzaffarnagar seed wheat ...	8	11	0			
(*c*) Ditto other seed and manures ...	463	6	0			
(*d*) Miscellaneous	398	10	3			
	1,256	7	6			
Carried over				1,256	7	6

	Rs.	P.	A.
Brought forward	1,256	7	6
(2) Pay and travelling allowance of the Agricultural overseers ...	1,665	0	3
(3) Cost of exhibiting implements and machines at agricultural shows	61	15	9
(4) Purchase of implements	1,397	0	0
(5) Cost of engraving plates for Mr. Mukherji's Handbook on Sericulture, with cost of wood	107	0	0
(6) Solicitor's fee on account of the lease of Babu T. N. Ghose's garden in connection with the Veterinary College ...	364	0	0
(7) Additional grant on account of subsidy to State emigrants to Burma	300	0	0
(8) Miscellaneous, including Rs. 420-2 for pay and travelling allowance of Head-master, Rampur Boalia Diamond Jubilee Industrial School	1,425	11	6
Total ...	6,577	3	0

Officers of the Department.

117. Mr. N. N. Banerjei has again rendered me valuable assistance throughout the year, his work being always careful and accurate. Mr. Rowland Nagendra Lal Chandra, my Personal Assistant, has done excellent work on the settlement side of my office.

I desire again to acknowledge gratefully the valuable help received by the Department from Major Prain, I.M.S., Superintendent of the Royal Botanic Gardens at Sibpur, from Dr. George Watt, C.I.E., Reporter on Economic Products to the Government of India, and from Dr. J. Walter Leather, Assistant Agricultural Chemist to the Government of India.

I have the honour to be,

SIR,

Your most obedient servant,

P. C. LYON,

Director of the Department of Land Records and Agriculture, Bengal.

APPENDIX I.

List of products of which specimens were collected for the Indian Museum, Calcutta, and for the Imperial Institute, London, during the year ending 31st March 1900.

Scientific names of the products supplied.	Vernacular names.	Quantity.	Parts collected.	Remarks.
1	2	3	4	5
1. *Malva verticillata Linn.*	Lafa (red) sag Lafa (white) sag	.....	Plant.	
2. *Gossipium herbaceum*..	Garo Hill cotton	.....	(1) *In boles.*	
	,,	1 lb. ...	(2) Seed.	
	,,	Some ...	(3) Twigs.	
3. *Cæsalpinia bonducella*	Karanja natar *phal.*	11¾ lbs. ...	Seed.	
4. *Ipomœa hederacea* ...	Kaladana ...	20 lbs. ...	Seeds.	
5. *Nigella sativa* ...	Kalajira ...	6 lbs. ...	Oil.	
6. *Lepidum sativum* ...	Halim ...	6 lbs. ...	Oil.	
7. *Anona squamosa* ...	Ata ...	28 lbs. ...	Dry leaves.	
8. *Phaseolus mungo* ...	Mung ...	60 lbs. ...	Seed.	
9. *Naravelia zeylania* ...	Chugalbaty ...	30 lbs. ...	Green stem.	
10. *Ischœmum anyustifolium.*	Sabai grass ...	8 lbs. ...	Plant.	
11. *Andrographis paniculata.*	Kalmegha ...	40 lbs. ...	Plant.	
12. *Thevetia nerifolia* ...	Kulkaphul ...	12 lbs. ...	Seed.	
13. *Mortynia diandra* ...	Bagnakhi ...	1½ lbs. ...	Fruit.	
14. *Lac*	Lakh *gala* ...	.....	Twigs and leaves of four kinds of trees.	Lac-coloured wooden toys, samples of shell lac, &c., woods of various kinds from the district of Gaya. *Churries*, children's toys, &c., from Pabna and *bedri* from Murshidabad, and some other samples from Patna and Chittagong, were also sent to the Reporter's office.

APPENDIX II.

A list of Agricultural Implements and Machines which have been tested in Bengal during the year ending 31st March 1900, and of those in use which are reported to have met with more or less marked success.

No.	Designation of implement.	Use.	Special advantage or instructions.	Price.	Where procurable.	Name and designation of official reporter.	Opinion.	Extent to which used by native agriculturists.	Remarks by Official Reporter.
1	2	3	4	5	6	7	8	9	10
	Behia sugarcane mill.	For crushing sugarcane.	Juice can be extracted in a short time with less labour and expense.	Rs. 65 to Rs. 70 for two-roller mills and Rs. 90 for three-roller mills.	Messrs. Thomson and Mylne of Behia, Shahabad.	The Commissioners of five Divisions.	Useful ...	Ninety-one mills sold at Rs. 6,646.	These mills are extensively used throughout Bengal and are very popular with the raiyats. The only Division into which they have not yet been introduced is Chittagong, but they are likely to succeed there as elsewhere with the gradual extension of sugarcane cultivation.
	Sugarcane-crushing mill.	Ditto ...	Very strong, well-made, and cheap.	Rs. 30 and upward, according to kind.	Messrs. Burn & Co., Calcutta.	.....	.....	Sold in thousands formerly. Sold 101.	There is still a great demand for them.
	Sheriff's Patent sugarcane mill.	.....	.....	.....	.....	Commissioner of Presidency Division.	.....	Largely used by the inhabitants of the district of Nadia.	
	Shallow evaporating pan.	For boiling sugarcane juice.	Yields best and highest outturn.	Rs. 30 each...	Messrs. Thomson, Mylne & Co., Behia, Shahabad.	Commissioner of Orissa.	.....	Sold 6 pairs at Rs. 180.	Liked very much by the people, and found serviceable.
	Nahan's Kibbling machine.	.....	.....	.....	.....	Commissioner of Bhagalpur Division.	.....	Not liked by the raiyats of the khas mahals.	Tested in the khas mahals of the Monghyr district.
	"Hindustan" plough	Ploughing ...	Lightness, portability, strength, and light draught; cost moderate.	Rs. 12-8 to Rs. 13-8.	Messrs. Jessop & Co., Calcutta.	Messrs. Jessop & Co.	.....	.....	Sold seventy ploughs complete, 30 sets iron works, 564 spare shares for No. 1, Hindustan plough and 1,410 spare shares for No. 2 Hindustan plough.
	Indian plough ...	Tilling the ground.	Drawn by bullocks; strong and cheap.	Rs. 7-8 to Rs. 11.	Messrs. Burn & Co.	Messrs. Burn & Co.	.....	.....	They are cheap, and have been tested by the Bengal Agricultural Department and are largely used.
	Sibpur wrought-iron soil-inverting plough.	Soil-inverting ...	Being made of wrought-iron, can be easily repaired. Is a cheap soil-inverting plough.	Rs. A. P. 7 0 0	Agricultural Department, Bengal.	The Commissioners of the Rajshahi, Chota Nagpur, Chittagong and Orissa Divisions.	.....	.....	Sibpur ploughs have been in use for some years in the Maldwar estates in Dinajpur and have been found satisfactory. On the other hand the Commissioners of the Chota Nagpur, Chittagong and Orissa Divisions report that the ploughs are found to be too heavy for the local bullocks and are consequently unpopular.
	Meston plough ...	Breaking and inverting soil.	Strong, durable, light, cheap, suitable for all kinds of soil, easy of repair and simple of construction.	4 0 0	Government experimental farm, Cawnpur.	Commissioner of Orissa.	.....	.....	Tested in the Kanika estate in Orissa Division and found useful.
	Baldeo plough ...	For ploughing light soils.	Inversion of soil. Simplicity of construction, cheapness, and efficiency of work.	2 0 0 to 2 8 0	Ditto ...	Ditto ...	.....	.....	Ditto ditto.
	Ditto ...	Ditto ...	Ditto ...	Ditto ...	Ditto ...	Commissioner of Chittagong.	Found useful by experiment.	.....	The local ploughs being cheap and easily procurable are generally used by native cultivators.
	Kaiser plough ...	For tilling lands	.....	5 0 0	Ditto ...	Ditto ...	Ditto ...	.....	Ditto ditto.
	Kodalies ...	Earthwork and excavation.	.....	Rs. 9-8 to Rs. 11-8 per dozen.	Messrs. Burn & Co.	.....	.....	Largely used by the people.	Demand was very great for these kodalies. Sold 7,253.

			Rs. A. P.					
Paddy-husking machine, bullock-power.	Husking paddy	Large outturn and more perfect work.	60 0 0	Ditto ...	.....	.....	Sold 12 machines.	
Winnowing machine for hand-power.	Cleaning the husked rice.	Cheapness and its thorough method of cleaning the rice.	55 0 0	Ditto ...	.....	.....	Sold 5 machines.	
Bull's Oil Mill ...	Extracting mustard oil from mustard oil-seed.	Low cost, portablity, ease with which it is worked.	85 0 0	Ditto ...	.....	.....	Sold one mill.	
Basak's patnet Oil Mill.	Ditto ...	Quantity of oil effectively extracted and good work.	Rs. 380 complete with bullock gear.	Ditto ...	.....	.....	Sold one pair.	
			Rs. A. P.					
Jiben's transplanting tools.	Transplanting tea plants.	.....	10 12 0	Calcutta ...	T. E. Thomson & Co.	.....	.....	
Planet junior cultivators.	Breaking and cleaning land after ploughing.	In cleaning and breaking up the land thoroughly, the shares being capable of being so placed as to run together and break up all the soil.	32 0 0	Messrs. Burn & Co., Muzaffarpur.	Commissioner of Patna.	Most useful ...	.....	Requires a pair of strong bullocks.

APPENDIX III.

List of seeds, implements, manures, &c., distributed by the Department, during the year 1899-1900.

		Mds.	s.	ch.
	Seeds.			
1.	Potatoes	622	0	0
2.	Oats	30	0	0
3.	Wheat	48	0	0
4.	Paddy	41	0	0
5.	Gram	6	36	0
6.	Arhar	4	0	0
7.	Castor	3	16	0
8.	Rhea	5	0	0
9.	Barley	1	30	0
10.	Mung	1	0	0
11.	Babul seed	1	0	0
12.	Maize	0	38	0
13.	Ground nut	0	25	0
14.	Sunn hemp	0	10	0
15.	Jute seed	0	12	0
16.	Cotton	0	10	0
17.	Sorghum	0	4	0
18.	Brinjal	0	3	8
19.	Chili	0	2	8
20.	Pea	1	1	0
		Tolas.		
21.	Radish	164		
22.	Cauliflower	162		
23.	Bean	85		
24.	Cabbage	38		
25.	Tobacco	61		
26.	Turnip	6½		
27.	Carrot	5½		
28.	Beet	4		
29.	Onion	5½		
30.	Knol khol	5½		
31.	Lettuce	½		
32.	Palam sag	1½		
		Kahan.	Pons.	
33.	Sugarcane cuttings	40	6	
		Tola.		
34.	Tomato	½		
		Rs.		
35.	Musur	5		
36.	Vegetables	10		
		No.		
37.	Mango grafts	50		
38.	Lichi „	50		
39.	Peach „	50		
	Implements.	No.		
1.	Sibpur plough	3		
2.	Baldeo „	2		
3.	Kaiser „	1		
4.	Meston „	5		
5.	Chain pump	1		
6.	Burdwan spade	4		
7.	Narhan Kibbling machine	1		
8.	Shallow iron pan	1		
	Manures.	Mds.	s.	ch.
1.	Bonemeal	2	20	0
2.	Castor cake	39	0	0
3.	Saltpetre	1	20	0

W. H. McG.—Reg. No. 1506J—550—10-8-1900.

REVENUE DEPARTMENT.

AGRICULTURE.

DARJEELING, THE 27TH SEPTEMBER 1900.

RESOLUTION—No. 1884T.—R.

READ—

The Report of the Department of Land Records and Agriculture, Bengal, for the year 1899-1900.

Letter No. 973A., dated 15th August 1900, from the Board of Revenue, submitting the Report with their remarks.

Read again—

Resolution on the same Report for 1898-99.

MR. P. C. LYON was in charge of the Department throughout the year, except for a period of two months and twelve days, when he was on privilege leave, and Mr. S. L. Maddox acted for him. Messrs. Nogendra Nath Banerjee and Dejen Lala Roy were his Assistants during the year. The report was submitted on the fixed date.

2. *Land Records Establishment—Registration of mutations under the Land Records Maintenance Act, III (B.C.) of 1895.*—The number of mutation offices under the Act was the same as in the previous year, viz., one at Bettiah in Champaran and two at Hajipur and Mahnar in Muzaffarpur. No new offices have been opened, nor has the Act been extended to other areas. The statistics furnished show that mutation work in these offices has considerably fallen off, and the unanimous conclusion at which the officers have arrived is that the Act has failed in its object. The reports of the Board about the maintenance of the records prepared in the recent survey-settlement operations in the three great circles of North Bihar, Chittagong, and Orissa have now been completed and received.

3. In the three mutation offices mentioned above, out of the total number of notices for registration filed during the year, only 1,286 were voluntary presentations by the parties under section 6 of the Act. The figures for the immediately preceding years were 2,061, 4,063, and 4,287, respectively, and this continued falling off is a sure indication of the unwillingness of the tenants to utilise the procedure afforded by the Act.

4. The number of holdings in which changes liable to registration annually occur has been estimated at from 8 to 10 per cent., but the number of such changes which have been actually registered on the initiative of the Registrar and of the parties combined has been in the last four years in Bettiah thana 2·22, 2 09, ·56, and ·47, and in Hajipur, including Mahnar, 1·76, 3·37, 3·25, and 1·35, respectively. Thus the number of registrations besides, being far below the recognised standard, are continuously diminishing, especially under the head of "Succession," where they depend on the initiative of the parties. In fact the penalties imposed by the Act are inadequate to overcome the inertia of the tenants, and the advantages given by registration are clearly an insufficient inducement.

As a matter of course, decrease in work was followed by a decrease in income from fees. The receipts from the three offices amounted to Rs. 1,514 as against an expenditure of Rs. 3,247, and the deficit of Rs. 1,733 had to be made good by Government.

5. *Mutation work in Government and Wards' Estates.*—To improve the present state of things and to secure better results in mutation work in these estates, District Officers were directed in paragraph 6 of the last year's Resolution to give greater attention to the examination of tenants' rent-rolls, themselves or by their Deputies, during their cold-weather tours, and to summarise the results of such examination as regards the number of transfers which

had not been noted in the records or reported by the tahsildars. Less was done than the Lieutenant-Governor hoped, but a start was made, and he trusts that the Collectors in these districts will give real help in this important matter.

As regards the registration of mutations, the best results in Government estates were obtained in Backergunge, Jalpaiguri, and Darjeeling, and the worst in Noakhali and Gaya. In Wards' estates good work appears to have been done in Tikari, and there has been a marked improvement in Dakhin Shahbazpur, but in Madhupur matters are particularly bad. It is not easy to frame satisfactory rules, and it is tedious to make the minute inspections necessary for their enforcement. Moreover, the raiyats themselves are as a rule apathetic, and generally averse to taking the initiative. But efficient management is so closely and obviously bound up with a correct *jamabandi* that the Lieutenant-Governor has no alternative but to press again this duty on the Collectors who represent the Government or the owners, who are under the Court of Wards, in the management of these properties. In future reports the results of the enquiries made by the Collectors and their subordinates in accordance with the orders in the Resolution on the last year's report should be given in the form of a tabular statement as an appendix, every district in which inspections were necessary being included, whether such were made or not.

6. *Maintenance of Boundary Marks.*—In December last the Director of Land Records submitted through the Board of Revenue a scheme for the maintenance of boundary marks erected in the course of traverse surveys made in the course of proceedings under Chapter X of the Bengal Tenancy Act, and towards the close of the year orders have been passed directing that—

(1) only trijunction marks should be maintained, save where a disputed boundary has been laid down, in which case these marks should also be maintained;

(2) that the duty of inspecting and reporting the marks should be done by village chaukidars; and

(3) that trijunction marks should be serially numbered for each thana and a list kept in each thana.

Considerable attention appears to have been given in many districts to the inspection of boundary marks in Government and Wards' estates, and, judging from the *resumé* of the reports received by the Director, the need of a regular system which will be ensured by the contemplated rules is plainly manifest. In future years the state of the boundary marks should be given in the form of a tabular statement appended to the report, every district in which there are boundary marks being mentioned, and special care being taken to show what was done during the year with reference to what had to be done.

The damage yearly done in Angul to boundary marks is phenomenal. No reason for this is given, and the Director will be good enough to submit a separate report on this matter showing the reasons for such a state of affairs and the remedies he can suggest for effecting an improvement.

7. *Utilisation of Land Records.*—The report of the Director has summarised the various directions in which the use of the cadastral surveys and the settlement records is being extended, and he rightly emphasises their value to local officers in substituting exact information for the vague general estimates which alone are attainable without them, especially in that most important part of a District Officer's duty, the settlement of land disputes, and the prevention of riots. For census purposes they promise to be specially useful. The Director does not one whit exaggerate their value.

8. *Scientific and National Enquiry under Imperial control.*—It is satisfactory to note that there has been no recrudescence of the betelnut plague in East Bengal during the year, and that thorough enquiries are being made into the prevalence of disease in sugarcane. It is still too early to pronounce any definite opinion on the effect of the passing of Act XIV of 1899, imposing a countervailing duty upon bounty-fed sugars imported from abroad, upon the sugar-refining industry of this Province. Little progress has been made in the investigation into the methods of reclaiming the *usar* wastes in Bihar.

9. *Working of the Civil Veterinary Department.*—A separate Resolution has already been recorded on the subject.

10. *Experimental Farms.*—The three farms maintained by the Department are those at Sibpur, Burdwan, and Dumraon: the one at Sibpur is a comparatively small one, and since the establishment of the agricultural classes at the Sibpur Engineering College, it is mainly utilised for the practical training of the agricultural students. Financially, the farm was worked at a loss of Rs. 2,707 as against Rs. 1,293 of the previous year. The great fall in the receipts from Rs. 1,205 in 1898-99 to Rs. 745 during the year under review is ascribed to the failure of many of the crops grown in the farm. The results of the enquiry now being made by the Director into the causes of this failure should be reported. At the Burdwan and Dumraon farms the operations carried on differed little from those of previous years, the most practically successful being the ratooning of *khari* sugarcane, the use of green manuring for certain crops, and the introduction of such crops as jute and potatoes in tracts where they have not been hitherto sown. Some attempts in the selection of seed were made, and the continued use each year of only the best seed ought to produce interesting results. Financially, these two farms were worked at less cost than in the previous year without loss of efficiency. There was no appreciable fall in receipts as regards the Burdwan farm; but in Dumraon they decreased from Rs. 941 to Rs. 736, due to the great damage done to all the *rabi* crops by the hail of January last.

11. With a view to a better understanding of the value of the experiments that are yearly made in experimental farms, His Honour would be glad if the Director would, in future, when narrating what has been done, discuss, for such of the experiments as will admit of the treatment, their financial results, in order that it may be seen whether there is any probability of their being adopted by the ordinary raiyat.

12. *Agricultural Experiments in Government, Wards' and Private Estates.*—The function of these experiments has been well expressed in the following extract from the Director's report:—

> Mr. Wheeler, Collector of Darbhanga, makes some pertinent remarks as to the scope of such experiments, and points out that they cannot be supervised with sufficient care to render any comparison of the effects of different manures or of different systems of cultivation of much value. He suggests that all that should be aimed at is the demonstration of the value of certain new crops or new varieties of old crops, which have already been successfully grown in our farms or elsewhere. Mr. Wheeler has rightly interpreted the aims of the Department in his remarks. It is impossible for the Managers of Government or Wards' estates to carry out exact and difficult experiments, and we are only anxious that they should assist in the introduction of suitable new crops, and of suitable new varieties of old crops, such as paddy, jute, wheat, and the like. While they are almost bound to fail in obtaining any information of real value from original experiments, they can utilise such information as can be made available to them through this Department in selecting and cultivating new crops and demonstrating their value to the raiyats of their estates.

When it has been demonstrated that a particular crop is suited for the soil of the locality, its cultivation should be persisted in, until the neighbouring cultivators have satisfied themselves of its profitable character. The gradual adoption of the crop as one of the staple products of the local agriculture is the ultimate reward of these efforts. It is reported that in the Government estates in Angul, Midnapore, and Jaipur, and in the Wards' estates of Rangpur some success has been obtained, and in Chittagong, Backergunge, Purnea and the Tikari Raj laudable efforts are being made.

Last year the Lieutenant-Governor observed with satisfaction the private efforts in this direction that were being made, and he has in the present report read with pleasure the appreciative remarks of the Director on the experiments made by Babu Charu Krishna Mazumdar, Zamindar of Islampur in Murshidabad, and Babu Ishwar Chandra Guha, of Jamalpur in Mymensingh.

13. *Sericulture.*—The work of the Silk Committee, whose duties are confined to the districts of Malda, Birbhum, and Murshidabad, has continued to meet with the most gratifying success. The work of teaching progressed rapidly under the Superintendent, Babu A. K. Ghose, and the number of rearers taught and turned out rose from 31 in 1898-99 to 47 in Malda, from 18 to 25 in Birbhum, and from 8 to 34 in Murshidabad. Many rearers learnt the use of the microscope thoroughly. The use of selected seed and of the various remedies advocated by the Committee increased rapidly; and the results in a larger

outturn of a superior quality of silk were notable. Financially, also, there is strong evidence of the practical value of the work which is being done by the Committee. In the previous year there was a deficit of Rs. 772; this year there has been a credit balance of Rs. 1,049 at the close of the year, the receipts amounting to Rs. 9,718 and the expenditure to Rs. 8,669.

The Rajshahi Diamond Jubilee Industrial School also made satisfactory progress in sericultural work during the year under review. There was a steady rise in the number of pupils taught—from 38 in the previous year to 54, of whom nearly a third are Muhmmadans. The students were sent out from time to time to help the villagers in the scientific selection of seed and in stopping outbreaks of disease. The grant of Rs. 2,000 made by the Government of India for some suitable work of agricultural improvement has been utilised in the erection of a masonry building to be used as a special seed-house. The Director of Land Records has written very highly of the continued excellent work of the Honorary Secretary, Babu A. K. Maitra, B.L., to which reference was made in last year's Resolution.

The Lieutenant-Governor has read the Director's remarks on sericulture with great pleasure; for he finds in them a record of practical work which has already achieved considerable success, and which promises a wide and valuable development of a purely indigenous industry.

14. *Sibpur Agricultural Classes.*—These classes were first opened in June 1898, and after a year's theoretical training the pupils were drafted off to various Government and Wards' estates for practical zamindari training. Then they were examined, and on the results of that examination appointments are being made in the Provincial, Executive and Subordinate Civil Services. It is hoped that such pupils as have been unsuccessful in obtaining Government appointments will find employment on private estates. The Lieutenant-Governor will watch the career of these pupils with interest, to see to what extent they keep up and apply the agricultural knowledge they have acquired; for in establishing these classes he has no intention of merely affording another and easier avenue to the ordinary public service. The proposal to extend the theoretical course from one to two years is approved.

15. *Fairs and Exhibitions.*—Altogether 14 agricultural fairs and shows were held at the places noted in the margin during the year, the two new ones being the Vishnupur Industrial and Agricultural Exhibition in the district of Bankura and the Calcutta Industrial Exhibition, the former of which received a Government grant of Rs. 100 and the latter Rs. 150. The total sum spent in these grants amounted to Rs. 1,900 as against Rs. 1,675 in the preceding year. The Alipur and Falakata fairs are, properly speaking, not agricultural shows, but are kept up for political reasons, having for their object the encouragement of trade between Bhutan and the plains. They were not successful this year, although they received the usual subsidy of Rs. 500 from Government. The remaining fairs are more or less cattle and horse shows, with the exception of those at Madhupur and Cuttack, where flowers, vegetables, and garden fruits have been exhibited. The Kalimpong and Suri fairs were very successful and afford much benefit to the people concerned.

1. Vishnupur in Bankura.
2. Suri in Birbhum.
3. Calcutta.
4. Kalimpong in Darjeeling.
5. Alipur } in Jalpaiguri.
6. Falakata }
7. Bera in Pabna.
8. Rukindipur in Bogra.
9. Sitamarhi in Muzaffarpur.
10. Berapur in Shahabad.
11. Tintanga in Bhagalpur.
12. Madhupur in the Sonthal Parganas.
13. Cuttack.
14. Sonepur in Saran.

16. *Cost of Agricultural Experiments.*—The cost to Government for agriculture experiments and miscellaneous enquiries conducted under the direct supervision of the Department has been Rs. 6,577 as against Rs. 6,156 in the preceding year.

17. *Merits of Officers.*—The Lieutenant-Governor cordially thanks Mr. P. C. Lyon for the diligent and interested care he has given to the several branches of the Department. The commendations bestowed by him on his Assistant Director, Mr. N. N. Banerjee, and on his Personal Assistant, Mr. Rowland Nagendra Lal Chandra, have been noted. The Lieutenant-Governor was much struck with the careful and accurate work of Mr. Banerjee on the Burdwan farm, and has since selected him for the charge of the Hutwa farm—a well-deserved promotion.

ORDER.—Ordered that the Resolution be published in the *Calcutta Gazette*, and that a copy of it, together with a copy of the Report and of the forwarding letter from the Board of Revenue, be submitted to the Government of India in the Revenue and Agricultural Department.

By order of the Lieutenant-Governor of Bengal,

F. A. SLACKE,

Secretary to the Govt. of Bengal.

Nos. 1885-86T.—R.

COPY forwarded to the (1) Secretary to the Board of Revenue for the information of the Board. (2) Appointment Department of this Government for information.

No. 1887T.—R.

COPY forwarded to the Director of Land Records, Bengal, for information and guidance with special reference to paragraphs 5, 6 and 11 and for submission of the reports called for in paragraphs 6 and 10.

No. 1888T.—R.

COPY, with copy of the report, forwarded to the Political Department of this Government for information and communication to the Inspector-General of Registration.

By order of the Lieutenant-Governor of Bengal,

E. LISTER,

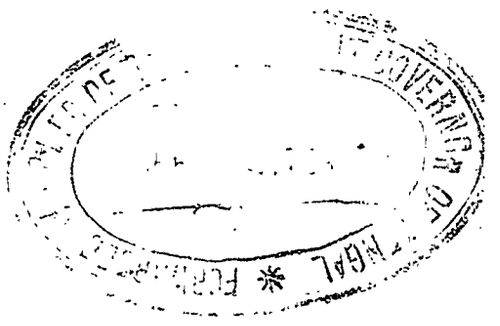
Under-Secy. to the Govt. of Bengal.

DARJEELING,
The 27th September 1900.

E. J. H.—Reg. No. 3344C—636—3.10.1900

REPORT

OF THE



DEPARTMENT OF LAND RECORDS AND AGRICULTURE,

BENGAL,

For the year ending 31st March 1901.

Calcutta:
PRINTED AT THE BENGAL SECRETARIAT PRESS.
1901.

Published at the BENGAL SECRETARIAT BOOK DEPÔT,
Writers' Buildings, Calcutta.

OFFICIAL AGENTS.

In India—

THACKER, SPINK & Co., Calcutta.
W. NEWMAN & Co., Calcutta.
THACKER & Co., Bombay.
HIGGINBOTHAM & Co., Madras.
SUPERINTENDENT, AMERICAN BAPTIST MISSION PRESS, Rangoon.
E. SEYMOUR HALE, 53 Esplanade Road, Fort Bombay.
RAI SAHIB M. GULAB SINGH & SONS, Proprietors of the Mufid-i-am Press, Lahore, Punjab.
MESSRS. COMBRIDGE & Co., Bombay.

In England—

E. A. ARNOLD, 37 Bedford Street, Strand, W.C., London.
CONSTABLE & Co., 2 Whitehall Gardens, S.W., London.
SAMPSON LOW, MARSTON & Co., St. Dunstan's House, Fetter Lane, E.C., London.
P. S. KING & SON, 2 & 4 Great Smith Street, Westminster, London.
LUZAC & Co., 46 Great Russell Street, W.C., London.
KEGAN PAUL, TRENCH, TRÜBNER & Co., Charing Cross Road, W.C., London.
B. QUARITCH, 15 Piccadilly, W., London.
WILLIAMS AND NORGATE, Oxford.
DEIGHTON BELL & Co., Cambridge.

On the Continent—

FRIEDLÄNDER & SOHN, 11 Carlstrasse, Berlin.
OTTO HARRASSOWITZ, Leipzig.
KARL W. HIERSEMANN, Leipzig.
ERNEST LEROUX, 28 Rue Bonaparte, Paris.
MARTINUS NIJHOFF, The Hague.

TABLE OF CONTENTS.

		Page.
CHAPTER I.	Prefatory	1
CHAPTER II.	Land records establishment:—Registration of mutations under the Land Records Maintenance Act, III (B.C.) of 1895; record of mutations under the rules prescribed in the Survey and Settlement Manual; boundary marks	1—3
CHAPTER III.	Utilisation of land records	3—4
CHAPTER IV.	Scientific and national enquiry under Imperial control:—Botanical examination of various leguminous crops; sola (*Æschynomene Indica*); betel-leaf (*piper* betel, *pân*); betel-nut plague in East Bengal; sugarcane disease (*Trichosphæria sacchari*); Bengal Sugar Commission, 1900-1901; prospects of the Indian sugar industry; jute; Dioscorea (yams); chemical analyses of soils by Dr. J. Walter Leather; chemical analyses of Indian food-grains and fodder by Dr. J. Walter Leather; saline efflorescence or *reh* in North Bihar; enquiry regarding the supposed injurious effects of well-irrigation in certain tracts in North Bihar; collection of articles for the Indian Museum and the Imperial Institute, London; Bengal Veterinary Department—Cattle-breeding	4—7
CHAPTER V.	Scientific and local enquiry under Provincial direction:—Analyses of districts; experimental and demonstration farms; agricultural experiments and the introduction of new and improved staples in Government, Wards' and private estates; the Agri-Horticultural Society of India; trial of improved agricultural implements in Government, Wards', and private estates; supply of seeds, manures and implements; crop-cutting experiments by District Officers and Settlement Officers; locusts and other insect-pests; sericulture	7—16
CHAPTER VI.	Agricultural education:—Agricultural classes at Sibpur; The Bengal Veterinary College	16
CHAPTER VII.	Publication of agricultural information	16 & 17
CHAPTER VIII.	Final:—Emigration to Burma; Agricultural Exhibitions; Provincial Museums; applications for patents for inventions; cost of miscellaneous experiments and enquiries; officers of the Department	17—21

APPENDICES.

	Page.
I.—Statement showing mutations and other particulars relating thereto in Government and Wards' estates	ii & iii
II.—A list of the agricultural implements and machines which have been tested in Bengal during the year ending 31st March 1901 and of those in use which are reported to have met with more or less marked success	iv & v
III.—A list showing seeds, implements, manures, etc., distributed by the Department during the year 1900-1901	vi
IV.—Cost of miscellaneous experiments and enquiries	

DEPARTMENT OF LAND RECORDS AND AGRICULTURE, BENGAL.

No. 2124A.

FROM P. C. LYON, ESQ., I.C.S.,

Director of the Department of Land Records and Agriculture, Bengal,

TO THE SECRETARY TO THE BOARD OF REVENUE, L.P.

Dated Calcutta, the 20th August 1901.

SIR,

I HAVE the honour to submit the Report of the Department of Land Records and Agriculture, Bengal, for the year ending on the 31st March, 1901. This is the sixteenth annual report that has been submitted by this Department on the subject of the work done under the heads of Agricultural Enquiry, Agricultural Experiments, and Agricultural Improvements. I must express my regret that, owing to my constant absence from head-quarters on tour during the month of July, I was unable to compile this report in time for its submission by the 31st of that month.

CHAPTER I.

PREFATORY.

2. I was in charge of the Department throughout the year under report. A full account of the tours of the Director is given each year in the annual report for the survey and settlement year, which ends on the 30th September. During the past financial year I was on tour for 169 days. Of my two Assistant Directors, Messrs. Dijen Lala Ray and Nagendra Nath Banerjei, the former was transferred to general duty on the 20th April 1900, and the latter went on deputation as Superintendent of the Sripur Farm under the Hathwa Raj on the 7th November 1900. Babu Giris Chandra Dutt has been appointed in the place of the former to take up the supervision of the office and statistical work of the Agricultural Department as my Personal Assistant on the Agricultural side; while Mr. Devendra Nath Mookerji, a graduate of the Cirencester Agricultural College, has taken the place of the latter as my Assistant in charge of the Experimental Farms, and for purposes of general inspection work in the mufassal.

CHAPTER II.

LAND RECORDS ESTABLISHMENT.

A.—Registration of mutations under the Land Records Maintenance Act, III (B.C.) of 1895.

3. The failure of this Act to secure the proper record of the mutations of names in settlement records has been amply demonstrated in past years, and the figures that have been kindly furnished to me by the Inspector-General of Registration, and which will appear in his Annual Statistical Statements, give further evidence to the same effect. The Act provides for the voluntary registration by all classes of tenants of mutations caused by inheritance, and of all other transfers that are not otherwise brought to the notice of the local Registrars and Sub-Registrars. It also provides that all transfers of landed property registered by these officers as Registrars of Assurances shall be brought by

them automatically onto the Mutation Registers. The real success of the scheme depends upon the extent to which advantage is taken by the tenants of the opportunity given for the voluntary registration of successions and other minor transfers, and it is in this respect that the Act has failed conspicuously. In the first year of the full working of the Act (1897-98) the number of such registrations was 4,063, which was far too small a figure, and even this figure has steadily fallen off in each succeeding year, the number of mutations thus recorded in the past year being 1,093 only.

The three offices at Bettiah in Champaran and at Hajipur and Mahnar in Muzaffarpur remained open during the year, but no new offices were started, and the Act will probably soon be allowed to fall into disuse.

B.—Record of mutations under the Rules prescribed in the Survey and Settlement Manual.

4. In accordance with the recent instructions received from Government on the subject of the compilation of this report, I have brought together all the figures illustrating the working of these rules in one statement, which will be found printed as Appendix I to this Report. Included in this statement will be found also the figures indicating the amount of inspection done by superior officers for the purpose of checking the work of recording mutations; these were called for by Government in their Resolution on my last Annual Agricultural Report.

The figures in this statement show, I think, a considerable advance in the record of mutations, and the work is being carried out more steadily and regularly in most of the areas dealt with. The following remarks may serve to explain some noticeable omissions from the statement and some of the more inadequate entries.

5. The detailed rules under which mutation work is to be carried out in the great estates of the Bettiah and Hathwa Wards in North Bihar have not yet been finally settled, and although mutation work is being done, no returns have as yet been received by me of the results achieved. I have asked the Commissioner and the Collector to obtain the necessary figures in the current financial year. For a similar reason no statistics are given of the mutations effected in the temporarily-settled estates of the district of Chittagong. The system proposed for this district, under which such work is to be confined to the record by the tahsildars of mutations in the names of tenants holding directly from Government only, has not yet received the final sanction of the Government of India. I have, however, asked the local authorities to furnish me with statistics of the work that is being actually done for incorporation in my next report.

No figures have been as yet received by me of mutations in the petty Government and Wards' estates in some of the districts in Bihar, such as Shahabad, Muzaffarpur, Saran and Champaran. The attention of the district officers will be called to the subject.

6. The figures given for Government estates in the Orissa Division show great variations. The work of recording mutations has not yet got into full swing in the district of Balasore, and it has only recently been commenced in the minor Governmment estates in Puri. The detailed rules for such work in Khurda and Angul are under revision, and it is improbable that adequate results will be obtained until those rules have been finally settled. The statistics of mutation work in Noakhali appear scarcely adequate, but the work has been carefully supervised. The same remark applies to the record of mutations in the Jaipur Government estates in Bogra, where only 1·6 per cent. of the tenancies changed hands during the year, no transfers due to succession being recorded at all.

7. I may note that mutations of *chukani* holdings in Jalpaiguri are registered on a voluntary system which is not likely to secure complete results, and that the large percentage of transfers recorded in the *jotes* of the Western Duars and the Darjeeling Terai is probably due to the fact that the work of registering mutations has recently been pressed on by the local authorities, with the result that many mutations left unrecorded in previous years have now been discovered and entered in our books. With regard to the figures for Wards' estates,

I may note that the registration of mutations in the Narhan Ward's estate in Monghyr does not appear to have been properly organised or supervised during the year. I have made some notes in the Remarks column of the statement, which may serve to explain sufficiently some minor details of the figures.

8. It should be added here, to make the information on the above subject complete, that the collection of statistics of mutation work for the Burdwan Ward's estates has been discontinued, under the orders of the Board and of Government, and that the final orders of Government have not yet been received as to the maintenance of the settlement records in the temporarily-settled estates of Orissa or in the permanently-settled estates of North Bihar.

C.—Boundary marks.

9. The information formerly incorporated in this Report under the above head used also to be given in the Annual Report of the Board of Revenue, L.P., on Land Revenue in Bengal, and under the orders of Government I have been directed to omit this paragraph from my present and my future reports.

CHAPTER III.

UTILISATION OF LAND RECORDS.

10. In previous reports I have noted under this head the various directions in which the use of the maps and records of settlements in Bengal is being extended. I have no further specific advance to record in the present report, but I may note that it is in contemplation to issue a note of instructions, for the information of district officials who have no personal experience of settlement work, as to the contents of such maps and records and the best methods of utilising them in the various branches of district administration.

11. Mr. C. G. H. Allen, I.C.S., in the concluding chapter (Part VI, Chapter III) of his final report on the settlement of the district of Chittagong, which has been issued during the past year, has recorded some interesting and important remarks on this subject which are worthy of all the publicity that can be given to them. As noted by him, the following five provisions of the law give validity to settlement maps and records prepared under the Bengal Tenancy Act:—

(1) The maps are to be presumed to have been made under the authority of Government, and to be accurate. [Section 83, Indian Evidence Act.]

(2) Every entry in the record of rights shall be presumed to be correct until the contrary is proved. [Section 103B, Bengal Tenancy Act.]

(3) Final publication of the record is conclusive evidence that the record has been duly made under Chapter X of the Bengal Tenancy Act. [Section 103A(2) of the Act.]

(4) All records published under section 105 of the Bengal Tenancy Act, 1885, before the 2nd November 1898, whether in draft or final form, are deemed to have been duly published. [Section 8, Act III (B.C.) of 1898.]

(5) Every settlement of rent or decision of a dispute by a revenue officer under Chapter X of the Bengal Tenancy Act, 1885, before the 2nd November 1898, in respect of which no appeal has, before that date, been preferred to the Special Judge appointed under section 108 of that Act, has the force and effect of a decree of a Civil Court in a suit between the parties, and is final; while every such settlement and decision subsequent to that date has similar force, and, subject to the provisions for appeals given in the amended Bengal Tenancy Act, is equally final. [Section 9 (1), Act III (B.C.) of 1898, and section 107, Bengal Tenancy Act.]

To these Mr. Allen also adds the provision of the Bengal Survey Act V (B.C.) of 1875 (under which all important surveys in Bengal are now conducted, which determines that no suit can be brought to set aside an order of a Superintendent or Assistant Superintendent of Survey, a Collector or a Deputy Collector deciding a boundary dispute, unless an appeal shall have been first preferred under section 59 or section 60 of that Act.

Mr. Allen points out that these presumptions and rules of law are of general application, and that it is the duty of those responsible for the civil,

criminal and revenue administration of a district to give full effect to them. He argues that the fullest use should be made of the maps and records in proceedings for the acquisition of land, and in all enquiries incidental to the administration of Government estates, as such use will familiarise the people with these documents, and will accustom them to rely on the facts recorded in the settlement of their own disputes. Mr. Allen concludes :—

"Unless the head of the district uses his influence in this direction, there is always a tendency to ignore settlement maps and records, a tendency which not infrequently leads to the most absurd results. An instance of this occurs when amins, with no regular professional training, and with very inadequate instruments, are sent out to survey land, of which maps made by a highly trained agency with the best instruments available already exist, and thus public funds are wasted and inaccurate results obtained. It should be the aim of the District Officer to insist upon the fullest possible use being made of the settlement maps and records by every officer employed under him, and this result can only be attained by the careful instruction of all officers in the use and handling of the maps and records. No persons should, in my opinion, be admitted to employment henceforth in any of the departments of the Collector's office who do not at least understand how to handle the maps and records, and the effect and significance of the entries contained therein."

In forwarding Mr. Allen's report I have ventured to invite the attention of the Board to these remarks, and to express a hope that they may be brought to the special notice of all officers subordinate to them.

CHAPTER IV.

SCIENTIFIC AND NATIONAL ENQUIRY UNDER IMPERIAL CONTROL.

Botanical examination of various leguminous crops.

12. Major Prain, I.M.S., Superintendent of the Royal Botanic Gardens informs me that he does not think it necessary at present to publish any bulletin on this subject, the results of his investigations into the matter having been to confirm the general accuracy of the information already incorporated in the "Dictionary of Economic Products" and in Bengal Bulletin No. II of 1896. He has forwarded me an interesting note, however, as to some details contained in the information referred to above, which I quote below :—

With reference to the list of pulses contained in Bulletin No. II, *Department of Land Records and Agriculture*, 1896, pages 4 and 5—a list by the way that has evidently been very carefully and accurately prepared—it need only be noted for the moment that, according to my views of the limitation of these species, the name *Phaseolus mungo* is really applicable to the crop known variously as *Urid*, *Birhi*, *Mash-kalai*, *Thikri-kalai* or *Birhi-kalai*, and that the name of the *Mug*, *Muga*, *Mung* or *Barai* crop is *Phaseolus radiatus*. This is no doubt merely another illustration of the fact that native names, while probably rigidly enough applied within a given area may be still used, but quite differently, applied, in some other area. The usage of *Sarisha* in Bengal and *Sarso* in Bihar, which are linguistically the same word for two quite different crops of the mustard family, is a familiar instance of this kind of interchange. In all probability in the locality, if we could now ascertain where that actually was, whence Linnæus received his original specimens of the plant to which he gave the name *Phaseolus mungo*, it is the plant known as *Mug* or *Mung;* but in the Lower Provinces it is not that plant, but the one to which he gave the name *Phaseolus radiatus* that is known as *Mug* or *Muga*. This plant, I find from the samples so kindly supplied by the Department of Land Records and Agriculture, is in some parts of the Lower Provinces known as "*kalai*," apparently the "*true* kalai," as opposed to *mash-kalai*—a name which is always applied, when used at all, to the plant otherwise known as *Urid* or *Birhi* or *Thikri-kalai* or *Birhi-kalai*, never to the plant known as *Mug* or *Muga*. The Lepcha name for *Mug* is, I find, *Kalha:* whether this is in any way related to the name *kalai* I cannot say. The Nepalese name, in Sikkim, for the same plant is *Mash*, whereas in the plains the term *Mash-kalai* connotes the *Urid*, not the *Mug* crops. In the plains the term *Mash*, by itself, does not occur. In the Western Himalayas, on the other hand, this name *Mash* (and the same usage prevails in Kashgar) applies to still another form of *Phaseolus* (P. radiatus VAR. grandis) of Chinese, not Indian origin. This, which is perhaps the true *Mash*, is known to the Nepalese in Sikkim at present as *Kalo Dal*.

In certain parts of Bengal I find, from the samples sent, that the common pea (*Pisum Sativum*) is grown along with or instead of the field pea (*Pisum arvense*). Both peas are known as *Matar ;* but in those districts where the two are grown I find that the field pea is frequently designated *Chhota matar* or *Geni matar*, while the common pea is named *Sada matar* or *Cabuli matar*, the latter an interesting designation as indicating a western origin for the crop in these provinces. To our information regarding the chick pea (*Cicer arietinum*), the lentil (*Lens esculentum*), (*Ervum Lens* of the *Bulletin*), the horse-gram (*Dolichos biflorus*), the

mothi (*Phaseolus aconitifolius*), the kesari (*Lathyrus Sativus*), the pigeon-pea (*Cajanus indicus*) or the cow-gram (*Vigna catjang*), I have nothing to add except that the cow-gram is the "*Simbriol*" of the Lepchas, the "*Bora*" of the Nepalese in Sikkim.

There ought, however, to be added to the list the bean (*Vicia Faba*), which is apparently sparingly cultivated under its usual name *Bakla*, in Tirhut; and besides this two other pulses have to be mentioned as crops in the Darjiling district, though not grown anywhere in the plains. These are *Glycine hispida*, the well-known *Botu-mash* of the Nepalese settlers, the *Salyang* of the Lepchas, and the less known *Phaseolus calcaratus*, which is the Lepcha crop *Parging*, the *Mashem* of the Nepalese. This last, I may add, was in one instance sent (from Kalimpong) under the name "Bhatmas," evidently in error, for it is not the *Botu-mash* of the hill people—not indeed very like the *Botu-mash*.

Sola (Æschynomene).

13. Dr. Watt, to whom a large collection of specimens of this plant were sent for examination, informs me that his report on the subject will be shortly sent to press.

Betel leaf (*Piper betel*, pan).

14. The botanical specimens collected for the purposes of a complete investigation into the different varieties of this plant grown in Bengal have unfortunately been found to be incomplete, many of them failing to show the flowers and fruits necessary for their definite determination. The issue of a report upon this subject has in consequence been delayed.

Betel-nut Plague in East Bengal.

15. Dr. Watt's report on this subject will be published shortly.

Sugarcane Disease (Trichosphœria Sacchari).

16. The final results of the long and careful investigation that has been made by Captain Gage, I.M.S., Curator of the Herbarium at the Royal Botanic Gardens, have been published in the form of an Agricultural Bulletin, No. 7 of 1900. It has been now established beyond dispute that the fungoid disease that has damaged almost all the canes sent from different districts in Bengal for examination is that known as *Colletotrichum falcatum. Went.*, which is said to be one of the many forms of *Trichosphœria Sacchari, Mass.* As to its identity with that disease, however, Captain Gage expresses no opinion. No other disease was apparently detected in the canes, but those which had not been attacked by the above fungus had suffered from the ravages of a beetle, originally described as a species of *Xyleborus*, but subsequently identified as *Dinoderus Minutus, Fabricius*. The traces of damage done by this beetle were very frequently found also in conjunction with the signs of *Colletotrichum falcatum*, but Captain Gage has found it impossible to say whether the fungus brings the beetle or the ravages of the beetle set up the fungoid disease. On the question of preventive measures, Captain Gage quotes with appreciation from an excellent report sent to him by Mr. J. H. Kerr, I.C.S., Settlement Officer in North Bihar, who attributes the spread of the disease to stagnant rain-water lying in undrained fields, and to the want of proper care in the selection for planting of slips that are free from the disease.

Bengal Sugar Commission, 1900-1901.

17. This Commission was appointed by the Government of Bengal in the course of the year to enquire into the prospects of sugarcane cultivation and sugar-refining on a large scale in Bengal. The Commission sat during the cold weather of 1900-1901, and presented its report in March last. The report was favourable to the prosecution of the industries referred to under certain well-defined conditions.

Prospects of the Indian Sugar Industry.

18. In connection with this subject a further report was submitted in the course of the past year as to the effect which had been produced upon the sugar-refining industry of Bengal by the working of Act XIV of

1899, by which countervailing duties were imposed upon bounty-fed sugars imported from abroad. In this report, which was submitted in November 1900, I intimated that there was as yet no perceptible increase in the area under sugarcane, but that all authorities agreed that it was as yet too early to look for such an increase. I also stated that, while there had been a rise in the prices of both *gur* and common sugar, this rise was attributed by many officers to the reduced outturn of the sugarcane crop of 1899, and to an increased consumption of both these commodities by the people. I added that there had been a distinct improvement in the position and prospects of the sugar-refining industry, due directly to the rise in the price of common sugar, which was in its turn indirectly due to some extent to the imposition of the countervailing duties. My enquiries into this subject are being continued, and the results will be reported to the Government of Bengal in November next. I may note here that the statistics of sugarcane cultivation in the current year show no material increase in the area under that crop. This is, however, due to some extent to a deficiency in the rainfall experienced in many districts during the planting season.

Jute.

19. The important enquiries commenced in 1899 for the purpose of determining the various kinds of jute grown in Bengal have been continued during the past year, and specimens are being steadily collected and forwarded to the Reporter on Economic Products to the Government of India, who has promised to deal with the subject when our collections are complete.

20. The district authorities of Backerganj have not found it possible to carry out the somewhat elaborate experiments which were recently suggested to them, with the object of determining whether the discoloration of jute complained of in this district was due to the presence of iron in the water employed for steeping the jute. These experiments should not, however, in my opinion, be difficult to carry out, and the results obtained from them might prove of considerable importance. I hope, therefore, that if an Agricultural Overseer is appointed to this district during the current year, the matter will not be lost sight of, and that an attempt will be made to determine the question by means of the experiments referred to.

Dioscorea (Yams).

21. A few more specimens of yams (*dioscorea*) were collected and forwarded to the Reporter on Economic Products to the Government of India during the year. Dr. Watt has informed me that his investigations in this matter are not far enough advanced as yet to permit of the preparation of an Agricultural Ledger on the subject, but that this will be undertaken as soon as possible.

Chemical Analyses of Soils, by Dr. J. Walter Leather, Assistant Agricultural Chemist to the Government of India.

22. No further action has been taken to utilise the valuable information afforded by Dr. Leather's analyses of certain Bengal soils, owing to the want of expert agricultural assistance in the Department. Until the Department has at least one Agricultural expert attached to its staff, it is impossible to deal effectively with such questions as these.

Chemical Analyses of Indian Food-grains and Fodder, by Dr. J. Walter Leather, Assistant Agricultural Chemist to the Government of India.

23. It is understood that these analyses, referred to in paragraph 66 of my Annual Report for 1899-1900, are being carried out by Dr. Leather, who has been sent a large mass of material of the same kind from other provinces as well. No report as to the results of the analyses has yet been received.

Saline efflorescence or Reh in North Bihar.

24. It has been found impossible, owing to changes in my staff and for other reasons, to take any further action towards dealing with this difficult subject.

Enquiry regarding the supposed injurious effects of Well irrigation in certain tracts in North Behar.

25. I referred to this subject at some length in my last annual report, and noted that, in the opinion of Dr. Leather, certain experiments that had been proposed in connection with these enquiries 'would have to be conducted with the utmost care, and would require detailed and expert supervision.' I added—"In the present circumstances of the Department, I have neither the money nor the establishment to carry out such experiments; and although I will try to collect further evidence as to the exact nature of the injury which irrigation is supposed to inflict on these particular lands, I am not sanguine of attaining any practical success." The circumstances of the Department have not improved since 1899-1900, and I regret to say that I have been unable to collect any further evidence on the subject.

Collection of articles for the Indian Museum and the Imperial Institute, London.

26. During the year under report a few specimens of various economic products were collected by this Department through its Overseers for the Imperial Institute, London, and were forwarded to the Reporter on Economic Products to the Government of India.

Bengal Veterinary Department—Cattle-breeding.

27. The Annual Report of the Civil Veterinary Department, Bengal, has been separately submitted to Government. No substantial progress has been made in the attempts to improve the breed of cattle in Bengal, but the subject engages Veterinary-Major Raymond's constant attention. The Sripur cattle-breeding farm in the Hathwa ward's estate has been opened, and action will be taken shortly to stock it by the importation of cattle from various parts of India. The proposals for the utilisation of the Pusa Government estate in Darbhanga in a similar fashion are for the present in abeyance, pending the receipt of orders upon an alternative scheme, by which this valuable property would be utilised as the site for an Institution of Agricultural Research, to include also an experimental and demonstration farm and a school for agricultural students.

At the suggestion of the Inspector-General of the Civil Veterinary Department an attempt is being made to collect for publication some information as to the various breeds of cattle in Bengal. This will, however, involve extended and careful investigation, there being at present little information of any kind available, and the circumstances of the various provinces included in Bengal varying widely. The Superintendent of the Civil Veterinary Department is taking the necessary steps to organise the needful enquiries.

CHAPTER V.

SCIENTIFIC AND LOCAL ENQUIRY UNDER PROVINCIAL DIRECTION.

Analyses of districts.

28. No further action has been taken to commence the analysis of the agricultural conditions of any fresh district, there being no officer in the Department available to conduct such an analysis, or, indeed, competent to carry one out.

Experimental and Demonstration farms.

29. I give below a brief account of the work done in each of the model farms that have been established under Government supervision in these provinces. In previous reports the work of the Burdwan, Dumraon, and Shibpur farms has been dealt with at some length; but as separate reports of the operations in the first two of these farms are annually printed and published, and as the Shibpur Farm is now maintained chiefly as an instruction ground for the agricultural classes attached to the Shibpur Civil Engineering College, I have thought it advisable to abbreviate my account of these farms in the present

report. The remaining three farms are at present quite new, and those at Gaya and Chittagong have been established mainly for purposes of demonstration, and not as adjuncts to any scheme of original agricultural research. It is possible, however, that some scientific work may hereafter be carried out on the Siripur Farm under the Hathwa Raj, the Superintendent of the Cattle-breeding farm, of which it forms a part, being an experienced and trained agriculturist. I may note, however, that it is out of the power of the Bengal Agricultural Department, with its present staff and resources, to properly organise and supervise agricultural experiments in any such farms, and all we can hope to do for the present is to maintain the Burdwan and Dumraon Farms on their existing footing, and to make some small efforts to introduce such new crops and improvements in agriculture as have been found successful in those farms into neighbouring tracts, and into the other farms dealt with below.

30. The Burdwan Farm, which has been in existence for sixteen years, is situated about 4 miles from the town of Burdwan, and consists of about 30 acres land, of which about 8 acres were under experimental cultivation, 14 acres were cultivated non experimentally, and the balance lay fallow during the past year. The farm is maintained by the Burdwan Raj, and its working was supervised throughout the year by my Assistant Directors—first by Mr. Banerjei and subsequently by Mr. Mookerji. The manure experiments during the year consisted of three series of experiments with paddy, two series with potatoes, and one series each with jute and sugarcane. The experiments with paddy tended to confirm our previous experience on this farm as to the excellence of bone-meal and saltpetre as a manure for this crop in Lower Bengal. The two fields manured with this combination gave an outturn of 56 and 45 maunds of paddy per acre respectively, and while the cost of cultivation per acre amounted to less than Rs. 40 per acre, the profit resulting amounted to between Rs. 80 and Rs. 100 per acre. The fields treated with bone-meal alone also gave noticeably good results, while cowdung manure at the rate of 100 maunds per acre proved profitable. In the experiments with potatoes, castor-cake (at 36 maunds per acre) gave the best results, a considerable profit per acre being secured, but the results obtained with bone-meal (12 maunds) and cowdung (1,200 maunds) were also good. Jute manured with bone-meal at 3 maunds per acre, cowdung at 150 maunds per acre or superphosphate made from bone (1½ maunds), and saltpetre (30 seers) gave very similar results, the profit in each case amounting to about Rs. 60 per acre. In the sugarcane experiments an excellent outturn was obtained by the use of a mixture of cowdung and bone-meal, but the financial results showed that far too much was being spent by us on both manures and cultivation, with the result that every one of the sugarcane fields showed a loss. These experiments will now have to be remodelled upon more practical lines. Experiments with paddy designed to test the value of thick and thin sowing showed results in favour of sowing at 60 lbs. to the acre as against sowing at 30 lbs. to the acre, both in the matter of outturn and actual profit. A similar set of experiments, in which selected seed was pitted against unselected seed, gave decisive results in favour of the selected seed. The results of several potato experiments designed to contrast the value of sowing cut sets and whole tubers showed that, given a certain quantity of seed potatoes, it paid better to sow them in sets than to sow them whole. The imported Patna potato seed showed the heaviest outturn. In variety experiments the Burdwan *Bansmati* paddy and the *Kajli* sugarcane gave the best results.

Over 150,000 cuttings of sugarcane and 1,800 whole canes were distributed for planting from the farm, besides 25 maunds of paddy for seed. The expenditure of the farm amounted to Rs. 2,099, and the return obtained from its produce was Rs. 1,644. When the excessive expenditure upon the sugarcane experiments has been cut down, the receipts and expenditure should almost balance each other, in spite of the cost of the pay of the Overseer and the financial disadvantages under which an experimental farm must necessarily labour.

31. The experimental farm at Dumraon consists of about 30 acres of land close to the Dumraon Railway Station, of which some 22 acres are under cultivation, the rest being occupied with buildings, roads and a tank, or lying temporarily fallow. The farm is maintained by the Dumraon Raj, the Manager of which, Mr. Charles Fox, takes a great interest in it. It is in contemplation to extend the farm to about double its present size, the new area

being devoted to the demonstration of the most favourable of the results already obtained in the farm, and the sanction of the Maharani of Dumraon has already been obtained to this extension. The operations of the year were much interfered with by unseasonable weather, the monsoon being delayed, severe storms in September and October doing damage to the paddy and sugarcane, and the heavy rain during the cold weather proving disastrous to wheat and other *rabi* crops. An examination of the financial results of the cultivation of various crops shows notable discrepancies when compared with those reported from Burdwan, the paddy crop, which is a source of great profit in the Burdwan farm, giving poor results here, while the sugarcane, which is such a drain on the resources of Burdwan, is cultivated at a profit in Dumraon.

There was not much to choose between the different kinds of paddy in the variety experiment with that crop, but the manure experiment gave results completely at variance with those reported from Burdwan; bone meal, which has proved so efficacious in the latter farm, giving a poor outturn when used as a manure for paddy in Dumraon. This result has been consistent through a series of years in each farm, and is worthy of special notice. The best manures for paddy in Dumraon appear to be castor-cake and cowdung.

The wheat experiments, which are of primary importance in Dumraon, were vitiated to a great extent by the prevalence of rust and by very unseasonable weather, and the outturn of the fields was in all cases poor. The results of the variety experiments were in favour of the white wheats from Buxar and Muzafarnagar as compared with red wheats from the same places and red and white wheats from Bombay, Cawnpore, and the Punjab (beyond Muzafarnagar). The manure experiments with this crop have shown for some years past that ashes of dung (the weight of the dung being 45 maunds per acre) and saltpetre (5 maunds)—a mixture which has also proved successful in smaller quantities in the case of paddy—is an excellent manure for wheat in Dumraon. The outturn of wheat this year was, however, in all cases so poor that all these experiments showed a financial loss.

In the variety experiments with sugarcane, the *khari* cane gave the best outturn and proved the most profitable, its cultivation yielding a profit of Rs. 55 per acre. There was not much to choose between the results obtained from the other varieties chosen for experiment. In the manure experiments with this crop the best outturn was obtained by means of a mixture of cowdung and superphosphate made from bone, but the cost of this manure was so heavy that the profits obtained from the application of town-sweepings, which did not give such a good outturn, were noticeably greater.

The cultivation of potatoes was not successful during the past year, and all the potato plots showed a loss. The general results obtained seemed to show that the Ghazipur variety was best suited to the soil of the farm, and that it was more profitable to manure at the rate of 180 maunds of cowdung per acre than at double or at half that rate.

Very valuable work is done by the farm in the distribution of seed, and 60 maunds of Buxar wheat, 30 maunds of Muzafarnagar wheat, 110 maunds of oats, 40 maunds of gram, and nearly 150,000 cuttings of sugarcane, besides smaller quantities of other seeds, were sent out in the course of the year.

The expenditure upon the farm amounted to Rs. 2,377 for the year and the receipts to only Rs. 811. The small outturn of some crops and the low prices at which the produce was taken over by the officer in charge of the Raj godowns contributed to bring about this poor result.

32. The work of the Sibpur Farm may be treated much more briefly. Owing to the nature of the soil no reliable experiments can be conducted on it, while in the past year the heavy floods of September, the theft of some of the produce from an insecure godown, and insufficient supervision, at any rate in the earlier part of the year, rendered any reliance upon the results obtained still more impossible. But a large number of crops were grown and much instruction was imparted by means of the cultivation of the farm to the students for whose benefit it is maintained. Among the crops thus cultivated were fourteen varieties of paddy, several varieties of sugarcane, various fodder grasses and fibre-producing plants, potatoes, maize, vegetables, *cassava*, Cabul gram, and some different species of cotton. Several new and improved implements were used on the farm for the benefit of the students, and some interesting

experiments were commenced with the mineral phosphatic manure 'apatite.' These will have to be continued for some time, however, and carefully checked, if they are to produce any results of importance. The financial results of the year's working showed heavy expenditure and small returns, but the farm cannot be expected to yield a profit when run for the benefit of the agricultural classes; and there has been an improvement in its management during the past few months which should raise the receipts of the current year.

33. The Siripur Farm in Saran consists of some 900 acres of land belonging to the Hathwa Raj, which it is proposed to lay out as a cattle-breeding farm with a view to the improvement of the local cattle. The site is admirably suited for the purpose, being in the centre of the extensive Hathwa estates, and consisting of a compact block of high land formerly used for growing indigo. The farm is being gradually developed, buildings and paddocks are being prepared for the cattle, the means of irrigation are being developed, and a Superintendent, in the person of Mr. N. N. Banerjei, formerly Assistant Director of Agriculture under me, has been appointed with effect from the middle of December last. Mr. Banerjei unfortunately suffered from serious illness for some months after his first appointment, but he has recently recovered, and has been able to take up his work in earnest. Of the lands of the farm, only 300 acres have for the present been taken in hand, the rest being let out on temporary leases to neighbouring cultivators. Fifty acres of these have been laid out in an experimental or demonstration farm, while the remaining area has been cultivated in various crops, non-experimentally, during the year. The few attempts made at experimental cultivation were not of much value, as, in the circumstances set out above, they received very little supervision, while the cloudy and rainy weather experienced in January and February last set up rust in the plots of wheat, which ruined the outturn. As at Dumraon, the Buxar and Muzafarnagar white wheats resisted rust better than any of the other varieties. Mr. Banerjei has noticed that the *tikchona* weed, noted by Dr. Prain as one of the chief 'hosts' of rust, is very much in evidence on the farm, and he is taking strong measures to eradicate it. Jaunpur maize, Bettiah potatoes, and Mokameh castor-seed did well, and some advance was made towards future demonstration work by the cultivation for cuttings and seed of several varieties of sugarcane and fodder grasses. In the non-experimental area the *rabi* crops did not do well, with the exception of oats, which gave a very fair outturn.

The whole produce of the farm for the year was valued at over Rs. 7,000, a not inconsiderable sum, and a great deal was done to prepare the way for the real work of the farm in the future. Well organised and managed, the Siripur Farm should become the most important institution of its kind in this part of India, and should prove of incalculable benefit to the raiyats of North Bihar. But the development of a cattle-breeding farm is a comparatively slow process, and visible results must not be looked for from it too soon.

34. The Tikari Home Farm at Gaya covers a small area of about 20 acres in the close neighbourhood of the civil station, of which about 15 acres are under cultivation, and the rest is used for buildings, roads, and pasture land. The farm is in close proximity to the house of the Tikari ward, on whose estate it is situated and for whose benefit it has been established. It is contemplated to improve the land by high cultivation and manuring, and to grow on it new and attractive crops, such as sugarcane, tobacco, potatoes, special varieties of rice, foreign varieties of maize, and the like, and to establish at the same time a good and practical dairy in connection with the farm, for the special use and instruction of the ward. The institution is as yet in its infancy, but an Overseer, a graduate of the Saidapet College in Madras, has now been in charge for more than a year, and the excellently planned buildings are approaching completion, while good crops of sugarcane and tobacco have already been obtained. These crops have attracted attention in the neighbourhood, and will probably be tried by some of the local zamindars in the coming season. Tobacco was cultivated on the farm at a considerable profit, and the area under this crop will be extended in the current year. A large four-roller mill for crushing cane has been imported from the North-Western Provinces, but it seems probable that Messrs. Thomson and Mylne's new three-roller mill would prove more useful, and one of these is now to be tried. These mills have proved a

great success on the Siripur Farm. Some fine buffaloes have been imported from the Panjab for the dairy, and this branch of the operations has now been removed from the ward's house to the farm, and brought under the direct supervision of the Overseer. The past season was unfortunately an unfavourable one in many respects, and the difficulties connected with the irrigation of the farm have proved more serious than was at first anticipated. Good progress has, however, been made, under the personal supervision of Mr. Ogilvy, the Manager of the estate, and at a recent inspection I found every reason to look for the ultimate success of the institution as a practical model farm.

35. The Chittagong Demonstration Farm has been established by Mr. J. H. Lea, Collector of the district, in the neighbourhood of the town of Chittagong, with the object of introducing new crops into the district. The farm covers an area of about twelve acres at present, but is being extended. The lands are representative of the average lands of the district, and are being carefully levelled, while excellent arrangements have been made for irrigation from the streams which come down from the hills around. The cultivation of the farm only commenced in the past year, but good results were attained, the produce being valued at nearly Rs. 1,000. Mr. Lea reports that the farm is much visited, and that some of the new crops tried in it have attracted considerable attention already, notably a variety of *aus* paddy from the Central Provinces, sugarcane, potatoes, and the *patal* or gourd crop. The district knows nothing of modern implements for the crushing of sugarcane, and the working of a three-roller Behia sugar-mill was watched with great appreciation. The cultivation of wheat and oats was fairly successful, but the area suitable for such crops in this district is comparatively small, and it seems doubtful whether they can be largely introduced with advantage. The cultivation of jute was not very successful, for various reasons carefully pointed out by this Department at the time, but this experiment will be zealously persevered in, as the introduction of this most valuable crop into this district should prove of considerable profit to the cultivators. New varieties of sugarcane, potatoes, onions, and paddy were cultivated at a profit, and will be sown again in the current year. The *patal* crop (*Trichosanthes dioica*), referred to above, achieved a special success, and the produce was eagerly sought after.

The farm is supported by Government as the chief land owner in the district, and by the Court of Wards. Considerable initial expenditure was incurred during the year in clearing and levelling the land, and in the construction of a weir in connection with the irrigation scheme. The farm is greatly indebted for its success to the personal interest shown in it by Mr. Lea, and the Khas Tehsildar of the district, under whom the work of the farm has been placed, has given much time and attention to it. Babu Hara Kumar Guha, formerly Travelling Overseer of this Department, has also done much to secure the introduction of approved methods of cultivation.

Agricultural experiments and the introduction of new and improved staples in Government, Wards', and Private estates.

36. It was noted in my last annual report that it was impossible for the Managers of Government and wards' estates to conduct any exact agricultural experiments on a scientific basis, and that all that should be aimed at by them is assistance in the introduction of suitable new crops and of suitable new varieties of old crops, and in the publication of information obtainable through the Agricultural Department as to improvements in staple crops. I am unfortunately unable to report that this Department has been able to do much to push this important work during the year. Its proper prosecution requires the services of an expert staff, which is not at my disposal, and all that the Department can do at present is to provide seed and give advice when application is made, leaving the direct supervision of the cultivation work to the local authorities. The result is that the success or failure of the work depends almost solely upon the degree of interest taken in it by the managers and their subordinates, and the energy with which it is supervised by them. Where the importance of these operations has been rightly appreciated, I find that they are being persevered in for a series of years,

and are beginning to make their value felt: where the local officers have no time to supervise the work themselves, and do not secure its supervision by others, there is lack of perseverance, bad cultivation, and poor results. While in both cases there may be poor crops in any given year, in the first case such a negative result is of value, while in the second it indicates nothing. I recently had an opportunity of formulating a scheme for the establishment of a local Institution of Agricultural Research at Pusa in Darbhanga, and in doing so I explained how valuable such an institution would prove as a centre of agricultural information from which the work of demonstration and experiment in other parts of the Province might be intelligently guided and controlled. Until some such central agricultural authority be constituted, with inspecting officers attached to it, capable of supervising and pushing this work, I fear that but little practical good can be accomplished.

I may note, however, in this connection that in the Backerganj district provision has been made for the appointment of a travelling agricultural Overseer, who will visit the various estates in which experimental cultivation is being conducted, instruct the raiyats to whom the seeds of new crops have been distributed, and advise the Collector generally in matters connected with the agricultural improvement of Government and wards' estates. I would venture to recommend this action to the attention of other district officers, as affording a practical means of securing some expert assistance in such work. It is probable that men who have recently passed through the Agricultural classes at Sibpur would be willing to accept such appointments if offered to them; and although they will themselves require guidance from experts in matters of importance, they could probably effect some improvement in the present state of affairs.

37. There is but little to record of agricultural work done on private estates; but Mr. Pal Chaudhuri in Nadia and Mr. Robindro Nath Tagore in Kushtia continue to maintain their private farms and to prosecute agriculture on improved principles in them, while Babu Charu Krishna Majumdar's experiments in Murshidabad have attracted considerable attention from his neighbours and from other gentlemen, to whom he has distributed seeds and cuttings of various kinds. This gentleman reports an unfavourable season for sugarcane and potatoes, but intimates that his experiment with *cassava* is progressing, and that his plants of that crop are doing well. Babu Gauri Sankar Roy continues his experiments on a small scale in Cuttack, and Babu Isvar Chandra Nandi of Jamalpur in Mymensingh informs me that his tobacco experiments succeeded, though his potatoes failed. Babu Hem Chandra Mitter, President of the Cossipur Horticultural Society, who has taken up a large area of land at Madhupur in the Sonthal Parganas, is cultivating vegetables, sugarcane, and other crops on improved methods, and is said to have instructed many Sonthal cultivators of his neighbourhood in those methods. I have received letters from two of the gentlemen who have recently taken up the cultivation of sugarcane on a large scale in North Bihar, informing me that the cuttings sent them from the Burdwan Farm have proved a great success.

38. We have continued to push the cultivation of potatoes in various parts of the Province during the past year, and we distributed a very large quantity of seed potatoes in the months of September and October last. After careful consideration of the disadvantages attendant on the growing of the Naini Tal variety, the expense of the seed, the impossibility of preserving them from year to year, and the difficulty in finding a market for them, I determined to send out more potatoes of the Patna variety, and the result of the change has been on the whole favourable. The season was not, however, a good one for potatoes, and their cultivation was, as usual, neglected in many places into which they have been newly introduced, the plants being neither adequately irrigated nor properly manured. The crops are reported to have been successful on the whole in Jessore, Backerganj, Rangpur, Bogra (where the outturn is said to have been excellent), Bihar, Kissenganj, Hazaribagh, Ranchi, Angul, and Khurda. All the potato experiments in the Bhagalpur Division appear to have failed—in many cases through want of due care, and from Faridpur and Gaya also unfavourable reports have been received. Considering the difficulties of the season, the results may be reckoned fairly satisfactory—certainly sufficiently so to warrant perseverance.

39. The *rabi* crops throughout the Patna Division suffered severely from heavy winter rain, and this proved discouraging to many experimenting officers, but oats have succeeded in many cases, and their freedom from *rust*, which ruined the wheat crop in the past year, has been thus brought into prominence. Among miscellaneous crops, in which interesting experiments have been successfully made, I may notice *sabai* grass, which is being introduced into some wards' estates in the Patna district; tobacco, which has been especially successful in Bogra, and Niger oil, the *sirguja* of Chota Nagpur, which is being cultivated with profit in Angul.

40. The work that is being done in the Orissa Division requires some special notice. In Angul and in all the five tributary states connected with that district, small model farms or gardens have been established, in which a large number of foreign crops and varieties of crops are grown for demonstration purposes. These gardens are inspected once or twice in each year by my Assistant Director of Agriculture, and appear to have all done fairly well in the past year. The work in the gardens attracts a good deal of attention locally, and some of the new crops have been such a conspicuous success that they are being adopted tentatively by some of the cultivators. The tendency has been hitherto to attempt to grow too many crops, and I have advised the promoters of these experiments to discard some of those which give small hope of success and to grow the remainder on larger areas. In Cuttack a good deal in the way of agricultural improvement has been done in the Madhupur ward's estate, where imported varieties of sugarcane have been cultivated with much success, and various experiments have been conducted in other Government and wards' estates. I note, however, that in the estate of the Kanika ward, where some promising experiments were carried through in previous years, the recent reports have shown little but failure.

The Agri-Horticultural Society of India.

41. It has hitherto been customary to reprint in this Report a long extract from the Annual Report of the above Society, dealing with the experiments conducted in its gardens or by its correspondents during the year. These experiments are, however, almost altogether horticultural; and as the Annual Report referred to is easily accessible to the public, it has been decided to omit the extract from this and future reports of the Agricultural Department. With the exception of a record of the increased demand for the Australian grass *Paspalum dilatatum*, there is little in the Report for the past year of special interest to the agriculturist, although from the horticultural point of view there is much that will repay perusal.

Trial of improved Agricultural implements in Government, Wards', and Private estates.

42. A few implements were distributed through the agency of this Department to various persons during the year. A brief list of the new or improved implements that have been tried in Bengal during the year is given in Appendix II. There is little to report beyond the rapidly increasing popularity of the various kinds of iron sugarcane mills.

Various accidents have combined to prevent the conduct of satisfactory experiments with the aermotor erected on the Sibpur farm, but there is every prospect of its being made full use of in the current year.

Supply of Seeds, Manures, and Implements.

43. A list of the principal seeds, implements, manures, etc., distributed by the Department during the year under report (exclusive of those used in experimental farms) is given in Appendix III.

Crop-cutting experiments by District Officers and Settlement Officers.

44. The next quinquennial report on the results of the crop-cutting experiments annually carried out in the districts of these provinces is due to Government in the year 1903. In the meantime the results of the experiments

made in 1897-98, 1898-99, and in 1899-1900 have been reported to me and have been compiled in a convenient form in my office. The returns of the past year are now coming in.

Locusts and other Insect-pests.

(1) Locusts.

45. In no part of Bengal did locusts appear during the year under report. This is the first time for several years that Bengal has been wholly free of locusts throughout the year, but they have reappeared in the current year in large numbers, and have caused more damage to the crops than they have done for many years past.

(2) Other Insect-pests.

46. The recent appointment of a Government Entomologist in the Indian Museum promises to be of great advantage to the Department in dealing with the many and varied insect-pests reported by district officers in Bengal. This officer has already given us much assistance in the identification of insects sent to him for that purpose, and has promised to visit places in the mufassal from which serious damage by such pests is reported, for the purpose of further investigation, when necessary. In the month of February last I drew the attention of all district officers to the advantages thus afforded, and asked them to send direct to the Entomologist for examination specimens of caterpillars, flies, and insects observed by them and their subordinates to do damage to crops. It is hoped that at the close of the current year considerable progress will have been made in the identification of the large number of insects injurious to crops which are at present known to us only by varying local names.

During the past year the Province did not suffer greatly from insect-pests, while more trouble was taken by Managers of Government and wards' estates than in former years to obtain and submit specimens of such pests as did actually do any damage. More care, however, is required in transmitting such specimens, and many were received in such a condition as to render them impossible to identify, while the spirit used for the preservation of others was in some cases so inferior as to cause more harm than good.

Many of the district reports are still so vague that no information of interest can be gleaned from them, and I may note that it is impossible to make any use of statements containing only vernacular names which convey no definite meaning, or general descriptive terms, such as 'small brownish insects,' 'long thin worms,' and so on.

The grasshopper *Hieroglyphus furcifer*, locally known as 'jhitika,' again did damage in the district of Puri, but the common rice *hispa*, which so seriously injured the paddy in Eastern Bengal in 1899-1900, is reported to have done little harm in the past year.

A caterpillar, known in the vernacular as 'phulguna,' reported from the Cuttack district, was identified by Dr. Watt as '*Achæa melicerte*,' a destructive pest found chiefly in Madras.

Heliothis armigera, Hübner, family Noctuidæ, was the identification given us by the Entomologist of a caterpillar that did a great deal of damage in various parts of the Province, but especially in Gaya, where it appeared in great numbers after the heavy rains that fell in the cold weather, and seriously injured the *rabi* crops.

Another caterpillar that did considerable injury to the rice crop in the Patuakhali subdivision of Backerganj, and was known locally as *ledapoka*, was identified as 'Leucania Extranea Guen.' Some valuable suggestions were given by Dr. Watt in this and in other cases for the destruction of the insects identified by him. The common sugarcane borer, *Diatræa saccharalis*, was reported from more than one district.

Except in the case of the *Heliothis armigera*, however, the damage done generally to crops by insect-pests during the year 1900-1901 appears to have been comparatively slight.

Sericulture.

47. The Bengal Silk Committee continued its work throughout the year; Babu A. K. Ghose, the Superintendent, being stationed at Berhampur in Murshidabad, Babu Abinas Chandra Sinha, Overseer, working in Malda, and the operations in Birbhum and Rajshahi being entrusted to sub-overseers. Three sub-overseers also worked under the direct supervision of the Superintendent and the Overseer. Operations were initiated by Babu A. K. Ghose in the district of Bogra during the year, and an Overseer has now been appointed to work in that district.

As in the previous years, the work consisted in the instruction of the rearers in the Pasteur system of rearing silkworms and in the use of the microscope for the selection of seed. The number of rearers thus instructed rose in Malda from 47 to 59, in Murshidabad from 34 to 43, and in Birbhum from 25 to 34. In Bogra, where the work is only now commencing, a few rearers have already begun to learn the new system. While the inspection of the results of the work in Birbhum by one of the members of the Committee disclosed that many of those who had received instruction were making little or no use of it, the reports from the other districts are more favourable, and show that almost all the rearers who have learnt the new processes are actually practising them. In addition to these men, a very large number of rearers have had their seed microscopically examined for them by the Overseers and other instructed rearers, with the result that a definite improvement has been noticed in the recent cocoon crops. Nearly 40 microscopes are now in use in various parts of the districts covered by the operations of the Committee, of which about half have been purchased by the rearers themselves, while the rest have been lent to rearers in areas in which the work has been recently commenced, or are kept by the instructing staff for purposes of demonstration.

48. The outturn of seed cocoons reared from selected seed under the superintendence of the Committee's officers largely increased during the year, and the results of the crops were in most cases good, though sericultural operations were seriously interfered with by the floods of September 1900. The prices obtained by the rearers for cocoons raised from selected seed were uniformly good. The work of sulphur fumigation has been carried on successfully, and the rearers who have taken out licenses for the sale of sulphur, in order to secure supplies of it at a moderate cost, are reported to have found their action useful as a check on the prices charged by the ordinary sulphur merchants to silkworm-rearers.

49. The report of the Silk Committee, of which I have been favoured with an advance copy, shows that the receipts for the year amounted to Rs. 10,354, while the expenditure was only Rs. 7,201. Several causes contributed to prevent the Committee from prosecuting and extending the work so vigorously during the year as their funds would have permitted, and in a note written by me in April last, after a careful enquiry into the progress of the work, I made several suggestions for the modification of the scheme of work which were willingly adopted. The Superintendent has now been set free from detailed instruction work for his duties of inspection, several new Overseers have been appointed, and the constant visits of the Superintendent have introduced greater energy into the work of the subordinate staff. In the meantime a model rearing-house has been completed at Ramnagar in Murshidabad, and a second has been commenced at Gonatia in Birbhum, and it is hoped that successful results in these nurseries will still further popularise the new system of rearing.

50. The Rajshahi Diamond Jubilee Industrial School suffered severely from an outbreak of cholera in June 1900, during which two of the students died and the institution had to be closed for several months. This seriously reduced the number of students and interfered to prevent any satisfactory crops of silkworms being reared during the year. All that can be said is that the school is now making up for lost time, and is rapidly recovering from what should prove to be only a temporary check. I visited the institution in April last, and made various suggestions for its improvement, upon which action is being taken, and the Commissioner of the Division has recently presided at a Conference of the Committee of the School, at which I was also present, which had been summoned for the purpose of considering the advisability of establishing

a demonstration class for illiterate rearers in connection with the school. The recommendations of the Committee and the Commissioner upon this point are now under submission to Government. The new rearing-house, erected with the assistance of a grant of Rs 2,000 from the Government of India, is an admirably-planned building, and the class-rooms and workshop that were built during the year at considerable expense are also suitable. The chief want of the school at present is a sufficient area of good mulberry land to afford food for large crops of worms. The Honorary Secretary, Mr., A. K. Maitra, has continued to manage the affairs of the school with conspicuous zeal.

CHAPTER VI.

AGRICULTURAL EDUCATION.

Agricultural class at Sibpur.

51. The system under which agricultural training is given to special classes of students at the Sibpur Civil Engineering College has been remodelled during the year. Under the original scheme there were to be two classes, a higher and a lower class, each receiving theoretical instruction for 14 months, and then going through a course of practical training in the mufassal for ten months. The lower class has now been closed as it failed to attract students, and the course of theoretical tuition for the higher class has been extended to two years, with brief periods of practical training in the mufassal during the long vacation in each year. Twelve students completed their course in the higher class, and six in the now defunct lower class, in the course of the year, and there are now eight students in their first year in the higher class. It is a noticeable fact that all these students are Hindus. The annual and final examinations have given satisfactory results on the whole, the students showing sufficient ability to absorb the instruction given them, but the system of work in these classes is not yet finally settled, as the present Agricultural Lecturer is about to be transferred, and it is proposed eventually to move the class to a new site should an Institution of Agricultural Research be established in Bengal. To supply the place of the lower class that has been abolished, it is in contemplation to start a vernacular class with the object of providing head-cultivators and subordinate overseers for model and experimental farms, but this scheme has not yet been definitely formulated and no action has been taken to carry it out. There has been much improvement shown in the management of the farm attached to the College.

The Bengal Veterinary College.

52. A separate report on the working of the College during the year 1900-01 has been submitted by the Principal of the College, Veterinary-Major F. Raymond, F.R.C.V.S., and has been forwarded by me to Government. All the 15 students who presented themselves for examination for their diplomas as Graduates of the College succeeded in satisfying the examiners—a result which bears testimony to the continued efficiency of the training given in this Institution.

CHAPTER VII.

PUBLICATION OF AGRICULTURAL INFORMATION.

53. A monograph by Mr. N. G. Mukherji, Agricultural Lecturer, Sibpur Civil Engineering College, on "The Silk Industry of Bengal," which was prepared during the year 1899-1900, is now in the press. Two Bulletins, No. 6 "Mustard" and No. 7 "Saccharum—Sugar," were published by this Department during the year under report.

54. The usual preliminary forecasts and final reports were published during the year, with reference to eight of the principal crops grown in the Province, as well as a general report on the outturn of the *rabi* crops of the previous season. The "Agricultural Statistics" of the previous year and the "Statistics of Minerals and Gems" were also compiled and published in the

sanctioned form, and the prescribed consolidated table shewing the average prices of food-grains, etc., in Bengal during the year 1899-1900, was prepared and issued.

CHAPTER VIII.

FINAL.

Emigration to Burma.

55. There was a considerable increase in the past year in the number of emigrants to Burma, towards the cost of whose fares a contribution was made by Government, 670 adults and 173 children being thus assisted, as compared with 472 adults and 98 children in the previous year, and much smaller numbers in the years preceding that. As this expansion in the emigration from South Bihar to Burma appears likely to continue, it is now proposed to increase the Government grant annually made for its assistance, and this proposal has been submitted by the Government of Bengal to the Government of India for sanction. The reports received from Burma as to the condition and prospects of those who have emigrated in previous years continue favourable, and the increase in the numbers of those emigrating appears to be due to some extent to the favourable reports received in the districts of recruitment from the emigrants themselves.

Agricultural Exhibitions.

56. The following exhibitions were held during the year, and grants of funds were made to some of them out of the allotment sanctioned by Government for that purpose:—

Name of place where exhibition was held.		District.		Government grant.
				Rs.
(1) Kalimpong	...	Darjeeling	...	500
(2) Alipur	...	Jalpaiguri	...	200
(3) Falakata	...	Ditto	...	300
(4) Khagra	...	Purnea	...	Nil
(5) Rukindipur	...	Bogra	...	200
(6) Sitamarhi	...	Muzaffarpur	...	100
(7) Berapur	...	Shahabad	...	Nil
(8) Tintanga	...	Bhagalpur	...	Nil
(9) Madhupur	...	Southal Parganas	...	100
(10) Cuttack	...	Cuttack	...	100
(11) Sonepur	...	Saran	...	125

All arrangements had been made to hold the annual exhibition at Suri in Birbhum in the month of February last, and I had arranged my tour so as to enable me to visit it, but on the death of Her Majesty the Queen-Empress it was at once decided that the arrangements should be cancelled as a mark of respect to her memory. The exhibition will, however, be held as usual next cold weather.

There were no industrial or agricultural exhibitions held in Calcutta, Vishnupur (Bankura), or Bera (Pabna) during the year.

I append a few brief notes as to the exhibitions referred to in the list above.

57. *The Agricultural and Industrial Exhibition at Kalimpong.*—This is an excellent institution, the most flourishing of its kind that I have seen in Bengal, the promoters having succeeded in rousing a keen interest among their neighbours in it, and the exhibits in almost all the classes being of admirable quality. Originally an annual mule fair, it has now become an exhibition for agricultural stock and produce of all kinds and also for indigenous products and manufactures, such as fibres, baskets, cloths, dairy produce, and the like. Veterinary-Major Raymond, Superintendent of the Civil Veterinary Department, Bengal, visited the show, and assisted in the judging of the mules and cattle, and I was glad to be able to visit the exhibition myself and to assist in similar work in the Agricultural section. Major Raymond reports that the

number and quality of the mules were quite up to previous standards, that the exhibits of cattle showed great improvement, and that in his opinion the exhibition as a whole was the best in size and interest hitherto held here. On the Agricultural and Industrial side the show maintained the high standard reported by Mr. Banerjei last year. The entries in the classes for fowls were remarkable for number and quality, and the policy of distributing as prizes imported fowls of various suitable breeds is bearing excellent fruit. The exhibits of maize, rice, *dâls* (a large variety), millets, chillies, and buck wheat were excellent, the success of the imported varieties of maize being especially noticeable. I observed that a prolific Canadian variety that bears its cobs low down, about two feet from the ground, and consequently out of reach of storms, was especially favoured. A large collection of fibres derived from various forest products was of interest. The total number of exhibits amounted to 1,455.

Among the suggestions made by me to the Committee for the management of future shows were—(1) that the exhibition should last for one day only, but that a longer time should be given for the classification of the entries in the larger classes; (2) that some further encouragement should be given, if possible, to the introduction of sugarcane; (3) that the plan of awarding prizes in almost all classes in kind should be further extended, and (4) that the exhibition of 'strings' of paddies should be gradually dropped in favour of sheaves or baskets.

The success of this exhibition is a notable example of what can be achieved by an energetic Committee that carefully studies local conditions and the agricultural and economic requirements of the district. The Honorary Secretary, the Revd. J. A. Graham, is much to be congratulated on the results of his zealous work in this direction.

58. *The Alipur and Falakata Fairs.*—These fairs, which are maintained for the encouragement of trade with Bhutan, were held as usual in the months of February and March 1901, and received a grant of Rs. 500 from Government, which was spent in sanitary arrangements and the erection of huts, and in providing miscellaneous entertainments. Owing to the small measure of success previously attained by these institutions, I recently enquired of the Commissioner of the Division whether he recommended the continuance of the Government grant in future years. Mr. Marindin has informed me in reply that the Falakata Fair was sufficiently successful in the past year to warrant its continuance, the fair being visited by a large number of Bhutias and merchants from all parts, and that he thinks it possible that the Alipur Fair would prove more attractive if it were removed to Santrabari, where it was formerly held, and if it was not held so soon after the Falakata Fair. These changes will now be made by him, and the result of them reported. The attendance at the Alipur Fair during the past year is reported to have fallen to 500, the value of the articles sold falling also to Rs. 3,500. On the other hand, the average attendance at the Falakata Fair on market days rose to 3,000, while the turn-over amounted to about Rs. 16,000.

59. *Agricultural Exhibition held at Rukindipur in Bogra.*—This small exhibition was originally started in connection with the Jaipur Government estates in the district of Bogra. The number of exhibits (840) at the show held in November last showed a slight increase over the number in the previous year (817) and a sum of Rs. 152 was raised by public subscription, in accordance with the suggestion made by me last year, to supplement the Government grant of Rs. 200. My further suggestions as to the number and value of the prizes have also been adopted, but the institution has not proved a success, and it is now proposed to remove it to the head-quarters station, where, although it will be of less value to the tenants of the Government estates, it may succeed in attracting more attention from the people of the district generally.

60. *Cattle Exhibition in connection with the Sitamarhi Fair in Muzaffarpur.*—This important annual fair commenced on the 28th March and lasted till the 6th April. It is reported to have been pretty well attended, and the entries in the exhibition held in connection with the fair are said to have been good; but owing to an unfortunate misunderstanding as to the date of the show, no officer of the Veterinary Department was able to attend. It is noticeable

that 13 half-Hissar bull-calves by the bull recently imported by the Veterinary Department were exhibited at the show, one of which received a prize. This calf was subsequently purchased for Rs. 30 for future use in the neighbourhood in connection with the efforts that are being locally made to improve the breed of cattle. It is hoped that more funds will be available in the present and future years for the purchase of such calves.

61. *Agricultural Exhibition held at Barahpur in Shahabad.*—This exhibition is held every year on the occasion of the old-established cattle and horse fair at Barahpur, with a view to improve the local methods of agriculture and to stimulate improvement in the breed of cattle and horses in the Shahabad district. This year's exhibition was held on the 17th and 18th of February last, and was visited by the Commissioner of the Division and the Collector of Shahabad. Babu Sarat Chandra Ghosh, Veterinary Assistant, Dumraon, who was deputed to the show on behalf of the Veterinary Department, reports that the number and quality of the animals exhibited showed a considerable falling off, though the reason for this is not stated. Mr. D. N. Mookerji, Assistant Director of Land Records, who visited the exhibition, reports a similar falling off in the number of the exhibits in the Agricultural section. Excluding the few entries under handicrafts, there were only 813 exhibits, against 1,565 of the preceding year. A sum of Rs. 721 was awarded in prizes in the various sections. A full note by the Assistant Director, containing some suggestions for improvements in the organisation of the fair, was forwarded to the Collector.

62. *The Tintanga Agricultural Show.*—This small show, the object of which is to acquaint the raiyats of the district with improved methods and implements of agriculture, was held this year on the 3rd February last and the two following days, and is said to have achieved some success. About 3,000 people visited this fair on the busiest day. At present the raiyats appear to be attracted to the fair mainly by the sports and amusements provided, but it is hoped that the institution may in time take root and prove of value to them hereafter.

63. *The Khagra* Mêla.—This is an old-established fair, held at Kishenganj in Purnea, on the estate of the Khagra ward. Its importance has recently attracted the special attention of the Court of Wards, and much has been done during the past few years to widely advertise the fair, to improve the *mêla* ground, and to introduce the sanitary measures necessary to the success of the institution. The fair appears to have been largely patronised in the past year, and to have been kept free from cholera and other epidemic diseases, although cholera was rife in the neighbourhood. The fair is attended by a fair number of Bhutias, who bring ponies for sale, and a large number of camels are said to be annually sold here for sacrifice by Muhammadans, the number thus sold amounting in the past year to about 150. Fifteen elephants, 1,800 horses and ponies, 5,000 buffaloes, 6,000 bullocks, and 100 rams are said to have changed hands during the fair, and the transactions in piece-goods, brassware, shoes, and other articles of merchandise during the month that the fair lasted are believed to have exceeded 5 lakhs in value. The receipts of the estate from the fair amounted to Rs. 8,112 as compared with Rs. 7,241 in the previous year, and a considerable sum was spent in advertising the fair, in providing amusements, and in the improvement of the *mêla* ground.

64. *The Madhupur Exhibition of Flowers and Agricultural produce.*—This annual show is held by the Founder and President of the Cossipur Horticultural Institute, who has of late years taken up a considerable area of land at Madhupur, in the Sonthal Parganas, for the cultivation of flowers and vegetables and for small agricultural experiments. The exhibition is mainly concerned with flowers, fruit, and vegetables, and little has been done to promote the agricultural side of it; that of the past year was held in February 1901, and appears to have been successful and to have been very well attended.

65. *The Cuttack Exhibition of Flowers, Vegetables, and Agricultural produce.*—This exhibition, which is mainly one of flowers, fruit, and vegetables, was held as usual in the last days of January 1901, but was unaccompanied on this occasion by the customary sports and races, out of respect for the memory of Her Majesty the Queen-Empress. The show appears to have attracted a large number of entries, and the classes for agricultural products were fairly filled,

though the exhibitors appear to have been mainly Chiefs of Tributary States, large zamindars, and the Managers of wards' estates, and not representatives of the cultivating classes, among whom the exhibition should, I think, be freely advertised. The large sum of Rs. 1,772 was raised by public subscription for the show, which appears to have been exceptionally well organised and managed. A sum of Rs. 1,384 now stands to the credit of the promoters of those exhibitions on account of the shows in this and in previous years.

66. *Cattle show in connection with the Sonepur Horse and Cattle Fair.*—This important fair was held early in November 1900, and appears to have been as usual largely attended. Veterinary-Major Raymond, who visited the fair, reports that about 25,000 bullocks, 3,000 horses and ponies, 800 elephants, and 500 milch cows, besides buffaloes, goats, and camels, were offered for sale. The numbers and quality of these were, on the whole, up to the usual standard, except in the case of the ponies, which were somewhat inferior. The arrangements for the cattle show were remodelled, and the proceedings appear to have been on the whole more successful than in previous years. A sum of Rs. 250 was distributed in prizes.

Provincial Museums.

67. The only Museum in the Province, in addition to the Indian Museum at Calcutta, which is not treated of in this report, is a small one at Dumraon, established by the late Maharaja of that place in commemoration of the Jubilee of Her late Majesty, the Queen-Empress, in 1887. The museum contains an interesting collection of specimens of grain, and a few specimens of improved implements and the like. It was originally intended to establish a large seed-depôt in connection with the museum, but this proposal was never carried out, and the museum is not consequently at present of much practical value. The collection is carefully kept by the present overseer of the Dumraon Model Farm, and it is in contemplation to remove it from the town to the farm, where it is more likely to attract attention.

Applications for Patents for Inventions.

68. Twenty-five applications for patents of an agricultural and commercial character were received from the Government of India for opinion during the year. Ten of these applications were for patents connected with the extraction and treatment of fibres; six were for improvements in the manufacture of indigo, and two were made in connection with rice-husking machines, one of which was rejected under section 6 (5) of the Inventions and Designs Act of 1888. The rest were for miscellaneous inventions connected with the cotton, jute and tea industries. The applications were dealt with by the Patents Branch of the Revenue and Agricultural Department of the Government of India, after the opinions of various experts as to the admissibility of the patents had been obtained through the agency of this Department.

Cost of Miscellaneous Experiments and Enquiries.

69. The cost to Government of agricultural experiments and miscellaneous enquiries conducted under the direct supervision of the Department of Land Records and Agriculture during the year under report amounted to Rs. 5,379-4-3, against Rs. 6,577-3-0 expended in the preceding year. The details of the expenditure will be found in Appendix IV.

Officers of the Department.

70. Mr. N. N. Banerjei continued to do good work for the Department up to the time of his deputation as Manager of the Siripur Farm in Hathwa in November 1900.

Mr. D. N. Mookerji has set himself energetically to acquire the experience necessary to enable him to fill Mr. Banerjei's place.

Babu Giris Chandra Dutt and Mr. Rowland N. L. Chandra, my Personal Assistants in the head-quarters office on the Agricultural and Settlement sides respectively, have done excellent work throughout the year.

Major Prain, I.M.S., Superintendent of the Royal Botanic Gardens at Sibpur, Dr. Watt, C.I.E., Reporter on Economic Products to the Government of India, and Dr. J. Walter Leather, Assistant Agricultural Chemist to the Government of India, have continued to render the Department that kindly and valuable assistance that I have had occasion to acknowledge gratefully in former annual reports.

I have the honour to be,

SIR,

Your most obedient servant,

P. C. LYON,

Director of the Department of Land Records and Agriculture, Bengal.

APPENDICES.

APPENDIX

Statement showing mutations and other particulars

Division.	Estate.	Area of estates in acres.	Number of tenancies.	Number of mutations.					Percentage of mutations to total number of tenancies.
				Sale.	Succession.	Partition.	Gift.	Total.	
1	2	3	4	5	6	7	8	9	10
									A.—GOVERNMENT
Dacca	Twenty-one estates in Backerganj ...	87,677	6,753	503	329	...	...	832	12·3
Orissa ...	Banki in Cuttack	74,900	20,053	1,020	646	27	2	1,694	8·4
	Nonnund, Birso, Chandbali and Saltgoia in Balasore.	17,900	9,940	179	50	22	2	253	2·5
	Kotdesh in Puri	110,562	14,223	40	...	...	...	40	·28
	Kodhar and Balukhand in Puri ...	5,851	1,035	...	...	...	...	...	...
	Khurda in Puri	565,356	176,753	5,571	63	1	17	5,652(c)	3·2
	Angul	408,350	28,579	14	669	28	1	712	2·5
Patna	Government estates in Gaya	65,274	6,699	218	233	23	...	474	7
Chittagong ...	Badu-Lakhi in Noakhali	21,386	1,334	29	12	...	4	45	3·3
	Rahim in Noakhali	5,682	382	...	1	...	...	1	·26
	Bharat Sen in Noakhali	3,355	187	3	8	...	...	11	5·8
Rajshahi ...	The Western Duars in Jalpaiguri ...	253,607	Jotes 9,971 Chukani holdings 11,176	922	622	5	21	(f) 1,570	15·7
	Jaipur in Bogra	128,288	6,544	24	34	...	2	60	·54
	The Darjeeling Terai jotes	28,233	834	61	39	...	2	102	1·6
		124,376		98	86	1	...	185	22·1
									B.—WARDS'
Dacca	Dakhin Shahbazpur in Backerganj ...	93,208	30,125	567	1,263	...	12	1,842	6·1
Orissa ...	Kanika in Cuttack	281,478	30,980	696	1,821	60	8	2,585	8·3
	Madhupur in Cuttack	51,648	24,125	25	3,781	9	5	3,820(g)	15·8
Rajshahi ...	Maldwar in Dinajpur and Purnea ...	88,329	10,837	137	676	...	14	827	7·6
Patna	Tikari in Gaya	248,795	48,174	2,742	3,838	1,151	...	7,731	16
Bhagalpur ...	Narhan in Monghyr	30,158	10,047	86	1	10	...	97	·96

I.

relating thereto in Government and Wards' estates.

Number of tenancies transferred.		Area transferred in acres.	Percentage of area transferred to total area.	Average area covered by a transfer.	Price paid per acre of land transferred.	Number of entries in rent-roll checked.	Number of unregistered mutations discovered.	Remarks.
In whole.	In part.							
11	12	13	14	15	16	17	18	19
ESTATES.								
					Rs.			
146	686	4,561	5·2	5·5	98	391	6	
599	1,095	1,203	1·6	·71	Not reported	1,367	103	
99	154	309	1·7	1·2	Noanund 45 Chandbali 1,125(a)	3,320	429	(a) The land on the foreshore at Chandbali is exceptionally valuable.
33	7	45	·04	1·1	76	...(b)	...(b)	(b) The work of recording mutations has just commenced, and no detailed record of inspection work has hitherto been kept.
...	...	...	...	...	.....	...	...(b)	(c) The figures in column 9, differ from the total of the figures in columns 11 and 12, as in many cases one mutation case affected more than one tenancy.
4,520(c)	1,611(c)	4,207	·74	·74	96	637	(d)	(d) No note of the results of the inspection work appears to have been kept.
693	19	3,461	·84	4·8	19 times the rent.	(e)...	(e)...	(e) Rent-rolls of nine villages were examined by the Deputy Commissioner and of six parganas by the tahsildar. Fresh rent rolls are being prepared and supplied to the village officials.
315	159	1,859	2·8	3·9	44	2,615	554	
20	25	994	4·6	22	80	674	21	
1	...	600	10·7	600	40	208	1	
10	1	156	4·6	14	60	90	8	
(f) 696	(f) 643	28,552	11·2	18	From 5 to 40	1,154	73	(f) The difference between the figures in column 9 and the total of columns 11 and 12 is due to several jotes having been transferred more than once in part.
14	46	653	·50	10	,, 5 to 25	...	...	
96	6	367	1·3	3·6	25	3,678	342	
20	165	8,625	7	47	15	243	65	
ESTATES.								
					Rs. A. P.			
304	614	3,092	3·3	1·6	45 0 0	1,484	114	
2,084	528	7,713	2·7	3·	16 9 0	9,869	865	
2,568	1,262	4,858	9·4	1·3	49 0 0	14,500	3,820	(g) The work has recently commenced, and a large number of the mutations now recorded are probably old ones. Regular inspection work will be done when the work gets into full swing.
827	...	5,392	6·1	6·5	18 4 0	5,758	775	
4,488	3,243	6,467	2·5	·83	80 14 0	(h)...	(h)...	(h) The work is just commencing. The Manager did much to instruct local officers in mutation work during his cold-weather tour, and will cause regular inspections to be made now that the work has started.
31	66	274	·90	2·8	45 11 3	92	62	

APPEN

A list of Agricultural Implements and Machines which have been tested in Bengal during more or less

No.	Designation of implements.	Use.	Special advantage or instructions.	Price.	Where procurable.
1	2	3	4	5	6
1	Behia Sugarcane Mill	For crushing sugarcane.	The juice can be extracted from the cane in a shorter time and with less labour and expense than by means of the ordinary wooden mill.	Rs. 64 to Rs. 135, according to size and kind of the machine.	Messrs. Thomson and Mylne of Behia, Shahabad.
2	Sugarcane-crushing mill.	Ditto ...	Ditto	Rs. 37 to Rs. 100 ...	Messrs. Burn & Co., Howrah Iron Works.
3	Sheriff's Patent sugarcane mill.	Ditto ...	Ditto	...	.....
4	Sugarcane mill with pinions.	Ditto ...	Ditto	Rs. 60 each	The Bengal Iron and Steel Co., Barrakar.
5	Sugarcane mill with yokes.	Ditto ...	Ditto	Rs. 50 each	Ditto ... ...
6	Sibpur plough ...	For tilling lands—Soil inverting.	Being made of wrought-iron can be easily repaired. Is a cheap soil-inverting plough.	Rs. 7 and Rs. 8 ...	Sibpur Experimental Farm, Sibpur.
7	Indian plough ...	Ditto ...	Strong and cheap	Ditto	Messrs. Burn & Co., Calcutta.
8	Howard's plough ...	For deep tillage ...	Strong and durable	About Rs. 25 ...	J. F. Howard, Bedford, England.
9	Martin's plough ...	.....	Simplicity of construction; inversion of soil, strength and durability.	.....	J. Martin, Agra ... ...
10	Chain pump ...	Pumping water from adjacent ponds or wells.	.....	Rs. 50	Director of Land Records, North-Western Provinces and Oudh, Lucknow.
11	Chaff-cutter	For cutting straw	Hand-power	Rs. 53 to Rs. 63 ...	Messrs. Burn & Co., Calcutta.
12	Paddy-husker ...	For husking paddy	Cheap and portable	Rs. 60 each	Ditto ... ...
13	Shallow evaporating pan.	For boiling sugarcane juice.	Improves quality and outturn.	Rs. 30 each	Messrs. Thomson and Mylne, Behia.
14	Steel yard	Weighing crops ...	Light and handy	Rs. 10 each	Director of Land Records, North-Western Provinces and Oudh, Lucknow.
15	Indigo-rake ...	Breaking clods, collecting weeds, and levelling land.	.....	Rs. 6	Gaya ... ...
16	Indigo-cultivator ...	Used as a bullock hoe and cultivator.	Simple in construction and cheap.	Rs. 6	Do. ... ...

DIX II.

the year ending 31st March 1901 and of those in use which are reported to have met with marked success.

Name and designation of official reporter.	Opinion.	Extent to which used by native agriculturists.	REMARKS.
7	8	9	10
.....	.....	.....	
.....	A cheap mill for crushing sugarcane.	Seventy machines have been sold.	These are all iron mills brought in to supersede the wooden country mills, and are modifications of those originally introduced into Bengal by the firm of Messrs. Thomson and Mylne of Behia in Shahabad. Their superiority to the old wooden mills is obvious, and the iron mill in one form or another is making its way into all parts of the Province. The superiority of the three-roller mill over the ordinary two-roller one has also been clearly proved in recent years, but as it is a more expensive machine, it has not yet come into general use.
.....	.....	The cultivators continue to use these mills largely in the district of Nadia.	
.....	.....	Twenty machines were sold.	
.....	.....	Twenty-five machines were sold.	
Commissioners of Rajshahi, Patna, and Orissa.	Fairly successful in special circumstances.	Used to a limited extent on Government and wards' estates and by advanced agriculturists.	These ploughs have proved useful in the reclamation of new lands and in stiff soils, but they are somewhat heavy for the degenerate bullock of Bengal, and are not likely to become generally popular.
Commissioner of Rajshahi.	Found satisfactory	Five ploughs were sold.	
Commissioner of Patna Division.	A satisfactory and efficient plough.	Not used by cultivators.	Too heavy and expensive for general use.
Ditto	Found useful in foul land.	.....	Previous experiments made with this plough by the Agricultural Department gave unsatisfactory results.
Khas tahsildar, Patya	Found to be very useful.	.....	
.....	.....	Sold 5 machines.	
.....	.....	Sold 18 machines ...	Suitable for husking boiled paddy.
Commissioners of Patna and Orissa.	The Commissioner of Patna says that these pans continued to give satisfaction. The Commissioner of Orissa speaks very highly of the improvement in quality and outturn effected by the introduction of these pans.	Sold 14 pans for Rs. 420. The use of these pans is increasing.	
Commissioner of Patna.	Useful	.....	
Collector of Gaya ...	.....	.....	Made by Mr. A. Ogilvy, the Manager of the Tekari Raj under the Court of Wards.
Ditto ...	.....	.....	Ditto ditto.

APPENDIX III.

List of seeds and manures distributed by the Department during the year 1900-1901.

	SEEDS.	MDS.	S.	CH.
1.	Potato seeds	560	0	0
2.	Oat	24	0	0
3.	Wheat	42	0	0
4.	Jute	11	20	0
5.	Gram	11	20	0
6.	Paddy	49	0	0
7.	Barley	4	0	0
8.	Maize	2	0	0
9.	*Arhar*	6	24	0
10.	Castor seed	2	20	0
11.	Onion	11	0	0
12.	Peas	6	20	0
13.	Arrowroot	1	10	0
14.	*Sunn* hemp	2	20	0
15.	Sugarcane cuttings	about 250 kahans (1 kahan=1280 cuttings).		

Also mustard, *til*, radish, cotton, chillies, *sorghum*, *musur* and other seeds.

	MANURES.	MDS.	S.	CH.
1.	Bonemeal	35	0	0
2.	Castor cake	81	0	0
3.	Mustard cake	2	0	0

APPENDIX IV.

Expenditure on Miscellaneous Experiments and Enquiries made by the Department.

		RS.	A.	P.
(1)	Experiments other than those made in experimental farms ...	841	6	3
	(*a*) Purchase of seed potatoes	336	14	0
	(*b*) Ditto other seeds and manures ...	118	9	9
	(*c*) Miscellaneous	385	14	6
		841	6	3
(2)	Pay and travelling allowance of the Agricultural Overseers ...	1,296	14	6
(3)	Purchase of implements	39	15	0
(4)	Cost of illustrations for the Monograph on Silk fabrics ...	1,255	0	0
(5)	Do. for the Report on the Betel-nut plague	231	4	0
(6)	Do. of lithographing, lettering, and printing plates for the Bulletin on Brassica	30	0	0
(7)	Additional grant on account of subsidy to State emigrants to Burma	620	10	0
(8)	Miscellaneous, including Rs. 440-12 for pay and travelling allowance of the Head-master, Rampur Boalia Diamond Jubilee Industrial School	1,064	2	6
	Total ...	5,379	4	3

L. H.—Reg. No. 1397J—500—21-8-1901.

Member in charge:
THE HON'BLE MR. C. W. BOLTON, C.S.I.

No. 639A., dated Calcutta, the 30th August 1901.

From—R. W. CARLYLE, Esq., C.I.E., Offg. Secy. to the Board of Revenue, L. P.,
To—The Secretary to the Government of Bengal, Revenue Department.

I AM directed to submit herewith the Director's report on the Department of Land Records and Agriculture for the year ending 31st March 1901, received with his No. 2124A., dated the 20th August 1901.

2. In Chapter II, the Director records the continued failure of the Land Records Maintenance Act, III (B.C.) of 1895. It is clear that the tenants generally will not take advantage of the Act to register successions and minor transfers, and that it would be useless to open additional offices.

3. The record of mutations under the rules in the Survey and Settlement Manual appears to the Board to have made some advance, though it is still far from complete in most estates. The revised rules for Angul have been submitted to Government. Those for Khurda are still under the Board's consideration, a further report having been called for from the Commissioner. With reference to the *chukani* holdings in Jalpaiguri the present system of registration (though not quite correctly described by the Director as voluntary, has proved a failure, as shown by the very small number of registrations as compared with the number of tenancies, and the local officers will be consulted as to its modification.

4. The Board have drawn the attention of the Commissioner and the Collector of Chittagong to Mr. Allen's remarks regarding the legal value of settlement maps and records and their proper use, which are quoted by the Director in his paragraph 11. These remarks will now be circulated to all Commissioners and District Officers.

B. S. Press—3072J—550—6.12-1901—C. A. P.

REVENUE DEPARTMENT.

AGRICULTURE.

DARJEELING, THE 2ND NOVEMBER 1901.

RESOLUTION No. 1953T.—R.

READ—

The Report of the Department of Land Records and Agriculture, Bengal, for the year 1900-1901.

Letter No. 639A., dated the 30th August 1901, from the Board of Revenue, submitting the report with their remarks.

Read again—

Resolution on the same report for 1899-1900.

MR. LYON has, in anticipation of orders, reduced the bulk of his report by one-half. The Special Officer's recommendations for curtailment have since been received and dealt with.

2. *Working of the Land Records Maintenance Act, III (B.C.) of 1895.*—The Lieutenant-Governor agrees with the Board that the statistics dealing with the working of this Act show that it would be useless to open any more offices.

3. *Record of Mutations in other areas under Special Rules.*—In the Resolution on last year's report, Government ordered that the Director should in future give particulars, showing the percentage of the number of tenants in the villages concerned in which the rent-rolls were examined by the Collector or his Deputies, and the results of these examinations as regards the number of transfers not noted in the records or reported by tahsildars. The information given in Appendix I of his present report by the Director does not quite comply with the orders in question, for it does not appear whether the records were examined in the villages concerned, nor for what percentage of the tenantry of such villages the records were examined, nor whether all the estates in which inspections were necessary have been included. These details should be given in the reports for the coming years, and it will avoid confussion if the word "unreported" in column 18 of the form, should be substituted for "unregistered."

The Director has lumped together the estates in each district, and the Lieutenant-Governor assumes that the Board are in a position to ensure that no single estate is, as regards inspection, omitted by the local officers or treated laxly. Turning to the figures of the report, it is clear that a great deal remains to be done before it can be said that matters are satisfactory, and he trusts that the requisite rules with regard to the Chittagong, Khurda, Angul, and Western Duars Government estates and the Bettiah and Hutwa Wards' estates will be in operation before the close of the present year. Some mistake has occurred with regard to the figures noted in column 10 against the Jaipur estate. The failure of the Manager of the Narhan estate can be considered by the Board with reference to his other work in the property.

4. The note of instructions which the Director of Land Records proposes to draw up for the information of district officials, who have no experience of settlement work, as to the contents of the settlement maps and records and the best mode of utilising them in the various branches of administration should be submitted to Government for approval, before being circulated. Instructions with regard to the utilization of the records in the trial of criminal cases arising out of land disputes have been separately issued by this Government in the Revenue Department letters Nos. 1342—49, dated the 27th August 1900, addressed to the several Commissioners of Divisions.

5. *Sugar industry.*—Sufficient time has not yet elapsed to enable Government to express any definite opinion on the effects produced by Act XIV of 1899. With a view to ascertain what were the prospects in favour of sugar growing and production in Bihar, a Committee was lately appointed by

Government to enquire into the conditions under which the industry was best calculated to prove remunerative. Their report has been published and has already led to the employment of a large amount of private capital in the industry.

6. *Chemical analyses of soils, food-grains and fodders, and enquiries regarding* reh *and the effects of well water on irrigation.*—The Lieutenant-Governor recognizes that the department as at present constituted, cannot effectively deal with these subjects, but trusts that useful results will be attained if the proposed scheme for the establishment of an institution for Agricultural Research at the Pusa Government Estate in Darbhanga, is brought into operation.

7. *Experimental farms.*—Besides the Burdwan, Dumraon and the Sibpur Farms, which have been in existence for some years, three new farms were opened during the year, namely, one at Tikari (maintained by the Tikari Ward's Estate in Gaya), one at Siripur (maintained by the Hutwa Ward's Estate in Saran) and one at Chittagong (maintained by Government). The opening of a fourth in the Pusa Government Estate in Darbhanga is under the contemplation of Government.

No important or new experiments with manures or in different methods of cultivation were conducted on any of these farms, but the Lieutenant-Governor recognizes that long continued and patient experiment is needed in these matters, and on the Chittagong and Burdwan Farms in particular, he has been pleased with the exact and minute interest which has been given to the conduct of them. The Burdwan and the Dumraon Farms worked at losses of Rs. 455 and Rs. 1,566 respectively; the former on account of the large expenditure incurred on sugarcane experiments, and the latter on account of the unseasonable character of the weather and the severe storms in September and October 1900. The Sibpur farm is no longer used as an experimental farm, but as a demonstration farm for the training of the students of the agricultural classes of the Engineering College there.

Before lending his support to the Director's suggestion in paragraph 36 of his report, the Lieutenant-Governor would like to know later on, what measure of success has been obtained in Backergunge through the travelling Agricultural Overseer.

8. *Sericulture.*—The Lieutenant-Governor learns with much pleasure that the popularity of Pasteur's system of rearing silkworms, which is being taught under the auspices of the Bengal Silk Committee, is continually increasing in the silk-producing districts in Bengal, and that a definite improvement has already been noticed both in the quality and outturn of the recent cocoon crops. The operations were extended to a new district, Bogra, during the year. The receipts and expenditure of the Committee were Rs. 10,344 and Rs. 7,201, respectively, during the year.

The progress of the Rajshahi Diamond Jubilee Industrial School was seriously interfered with by an outbreak of cholera among the students. The Lieutenant-Governor again commends the zeal and energy displayed by the Managing Committee of the School and by Mr. A. K. Maitra, the Honorary Secretary, in improving its condition and enlarging its scope since its first establishment in January 1898, and expresses the hope that the want now felt of a sufficient area of good mulberry land to afford food for large crops of worms reared in connection with the sericultural training imparted in the school, will be supplied by the Committee at an early date.

9. *Agricultural Education.*—The most notable point under this head is the abolition of the lower of the two agricultural classes in the Sibpur Civil Engineering College which had failed to attract students, and the extension of the course of the higher class from 14 months to two years.

10. *Merits of officers.*—The thanks of the Lieutenant-Governor are given to Mr. P. C. Lyon for the ability and zeal with which he has conducted the administration of the Department under his control. His commendations of Mr. N. N. Banerjei, lately an Assistant Director, and now employed as the Manager of the Siripur Farm, and of Babu Giris Chandra Dutt and Mr. Rowland Nagendra Lal Chandra, his Personal Assistants, have been noted.

ORDER—Ordered that the Resolution be published in [illegible] and that a copy of it, together with a copy of the report and letter from the Board of Revenue, be submitted to the G[illegible] in the Revenue and Agricultural Department.

By order of the Lieutenant-Governor of Bengal,

F. A. SLAC[illegible],

Secy. to the Govt. of Be[illegible]

No. 2209T.—R.

COPY forwarded to the Secretary to the Board of Revenue, Land Revenue Department, for the information of the Board.

No. 2210T.—R.

COPY forwarded to the Director of Land Records and Agriculture, Bengal, for information, with special reference to paragraphs 3, 4, 6, and 7.

Nos. 2211-12T.—R.

COPY, with copy of the report, forwarded to the (1) Political Department of this Government for information and communication to the Inspector-General of Registration. (2) Appointment Department of this Government for information.

By order of the Lieutenant-Governor of Bengal,

L. E. B. COBDEN-RAMSAY,

Under-Secretary to the Government of Bengal.

CALCUTTA,
The 2nd November 1901

B. S. Press—4094C—708—23-11-1901—W. H. McG.

00133033

Digitized with financial assistance from

Government of Maharashtra

on 01 February, 2020